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Does Fascia Bowen Therapy Improve Neuromuscular Function and Psychological Well-Being in Males Aged 8-11 (At Primary School) with Dyspraxia/Developmental Coordination Disorder?

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Regardless of whether someone is an intrepid explorer who pushes himself to the extremes of endurance or someone like myself who battles equally with the daily challenges of disability in order to realise a dream, a successful end result for both people is equally deserved. This doctoral process has been one such endurance test whose overall effect has been to change me, irrevocably but, hopefully, for the better, both academically and where understanding my own disability issues has been concerned. I owe a debt of gratitude to many people for their involvement, assistance and encouragement, but additionally I give thanks to God as my faith to overcome any difficulty is grounded in Him.

Gareth Davies, my husband, has acted as my technical and emotional mentor during the academic years 2011 to 2015. He has also been my most ardent supporter throughout. At no time did he doubt me even when my cognitive challenges were often more than I thought I could bear. My youngest children, Ioan and Isaac, urged me to enrol onto the doctoral research programme. All have lived through this process with me experiencing its negative effects along the way. My student colleague Mike Ellis alerted me to my eligibility for Disabled Students Allowance through Student Finance England. Receiving this allowance changed my life as I was ultimately granted 165 hours, per academic year, of study skills assistance due to the severity of my cognitive difficulties. My student colleague Dominique Wakefield has been a constant encourager.

My supervisors, Dr Chris Ashwin at the University of Bath and Dr Fiona Knott at the University of Reading, have been a much appreciated presence and font of knowledge and experience to draw upon. My first supervisor and study skills tutor, Dr Ken

Howells at Oxford Brookes University, was an inspiration. Without him I wouldn't have got through the first year. My current study skills tutor, Hannah Yellop, Assistant Psychologist at the Child and Adolescent Mental Health Service, has been a God-sent technical, organizational genius. I could not have coped without her guidance and support. She recognized my disability issues from our first meeting and made me feel safe.

I am indebted to all the parents, children and school staff who committed their time to this research and who offered me the opportunity to work with them. Finally, my research colleagues Mary Lymer (Occupational therapist) who assessed each child before and after their interventions, Julie James (Fascia Bowen practitioner) who treated the children and Tessa Roots, my research assistant, who telephoned all the parents in weeks 1 and 8. These individuals believed in the significance of this novel piece of research and committed themselves wholeheartedly to the process, always maintaining the highest standards of professionalism. I could not have done this without their input and enthusiasm.

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PREFACE

The idea for this thesis was inspired by reading an article by Andrew Bounds in the Financial Times on September 17th 2011 whilst attending one of Mr. Howard Plummer's Fascia Bowen courses in Cardiff. The article's title was 'Cost of Social Problems Put at £100bn'. In it, the author suggests that the Government could save billions if they invested in early interventions as this would lessen the impact of behavioural issues in children (Bounds, 2011). This is certainly in line with a suggestion found in a scoping review regarding best practice principles for the management of children with Developmental Coordination Disorder (DCD) to prevent secondary consequences and to improve children's functioning (Camden et al., 2014).

Following 20 years of experience treating children with Fascia Bowen therapy to address developmental challenges, I believed that it was my duty to design a research study to test the efficacy of this manual therapy. Until now it has only had anecdotal evidence to recommend it. My interest in testing its efficacy is rooted in personal experience of disability and from the work I do in my private professional practice located in the heart of a West Berkshire rural community. This is where I have practised as a Homeopath and a Bowen and Fascia Bowen practitioner, following a road traffic accident in 1998 which rendered me incapable of fulfilling my role as a law firm’s Head of Investment. With a diagnosis of Post-Traumatic Stress Disorder (PTSD), physical injury, and a later diagnosis of frontal lobe damage, severe memory transfer and retention problems, I was given a less than satisfactory conventional treatment plan which didn't address my specific difficulties and individual requirements.

In view of my own experience, I suspected that a lack of patient choice for available treatments might be the experience of others too. I certainly found this to be true for the families of children with DCD that I met during the research process. So, my journey to help myself facilitated learning procedures to assist others with various disorders, using Complementary and Alternative Medicine (CAM) options instead of the available conventional treatments. CAM incorporates groups of different medical and healthcare systems, practices and treatments which are generally not considered by the conventional system’s healthcare provision. Examples of CAM are homeopathic medicine, remedial touch therapies, osteopathic treatment, acupuncture, Chinese medicine, and generally those treatments which are holistic in their approach.

My aim from the outset was to find treatment methods adopting truly individual, holistic methods and, as I discovered these, I was treated successfully. While attending statutory, Continuous Professional Development (CPD) courses for the treatments identified e.g. Fascia Bowen and Bowen, I realized that only anecdotal data, collected over 20-25 years, existed to prove their efficacy. In view of this distinct lack of available hard scientific evidence there was an indication that it was unlikely that these interventions would be incorporated into the conventional medical system in the near future. As a result I opened a free children's Fascia Bowen therapy clinic to gather qualitative data before progressing to formal University approved research. This would permit me to assess its efficacy using rigorous, scientific methodology during the collection of quantitative and qualitative data. I discovered, after brief treatment schedules, that parents reported improvements in their children's motor skills, confidence, social interaction, recall, concentration and anxiety levels. Parents also reported that their children were establishing friendships for the first time in their lives after undergoing the treatment.

ABSTRACT

Background: Dyspraxia, also included under the term Developmental Coordination Disorder (DCD), is a condition characterised by an impairment in motor skills function which impacts negatively on other aspects of daily living such as athletic capability, handwriting, self-esteem and social interaction. However, no effective therapy currently exists to address all of these issues within this group. The aim of the present study therefore was to investigate whether a complementary therapy, called Fascia Bowen therapy, would improve neuromuscular function and psychological wellbeing in males aged 8-11 (at Primary School) diagnosed with this condition.

Methods: A group of 10 participants meeting the criteria of 15th centile or below in motor skills functioning, received a Fascia Bowen therapy treatment session from a qualified Fascia Bowen practitioner each week for 6 weeks. All participants' motor skills function were assessed by an occupational therapist before and after the end of the intervention using the Motor Skills Assessment Battery for Children test (MABC-2). Additionally, parents, teachers and participants completed questionnaires measuring self-esteem, social skills, social interaction, behaviour and scholastic function before and after the intervention.

Results: The participants showed significant improvement in neuromuscular function over time using the MABC-2. However, no significant changes were shown in the other measures of functioning. Although parents did provide some anecdotal reports about positive changes in real life, these were not reflected in the measures. The results suggest that while improvements were shown as significant in the motor domain, which was the focus of the therapy, the results did not translate to other domains of life over time.

Conclusions: Further research is necessary to test the efficacy of the treatment's effects using a larger sample, a control group and a longer intervention timescale. A six week intervention period may not be sufficient to show significant changes in self-esteem, social skills, social interaction, behaviour and scholastic functions which have deep-rooted constructs developed over many years. These may therefore take a long time to change.

ABBREVIATIONS

Abbreviation	Definition
ADHD	Attention deficit hyperactivity disorder
ADL	Activities of Daily Living
ASD	Autism Spectrum Disorder
BIS	Bilateral Integration and Sequencing
CAM	Complementary and Alternative Medicine
CKS	The Clinical Knowledge Summaries
CNS	Central nervous system
CO-OP	Cognitive Orientation to Daily Occupational Performance
CPD	Continuous Professional Development
DAMP	Deficits in attention, motor control, and perception
DCD	Developmental Coordination Disorder
DCD-Q	Developmental Coordination Disorder Questionnaire
DSM-V	Diagnostic and Statistical Manual of Mental Disorders 5th-edition
EACD	European Academy for Childhood Disability
EBM	Evidence Based Medicine
EEG	Electroencephalogram
EU	European Union
EYFS	Early Years Foundation Stage framework
FCAT	The Federative International Committee on Anatomical Terminology
FD	First dorsal interosseous muscle
FMRI	Functional magnetic resonance imaging
FRC	The Fascia Research Congress
HP	Health Promotion
HRT	Hormone Replacement Therapy
ICD-10	International Classification of Diseases and Related Health Problems
ICF	International Classification of Functioning
KT	Kinaesthetic Therapy
LBD	Le Bon Départ
MABC-2	The Movement Assessment Battery for Children Second edition
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
Ofsted	Office for Standards in Education
OT	Occupational Therapy
PMD	Perceptual Motor Dysfunction
PMT	Perceptual Motor Training
PTSD	Post-Traumatic Stress Disorder
RA	Rheumatoid Arthritis
RCN	Royal College of Nursing
RCOG	Royal College of Obstetricians and Gynaecologists
RCT	Randomized controlled trial

Abbreviation	Definition
SCQ	The Social Communication Questionnaire
SI	Sensory Integration
SID	Sensory Integration Disorder
SIGN	Scottish Intercollegiate Guidelines Network
SIT	Sensory Integration Disorder
SoH	Society of Homeopaths
SPP	Self-Perception Profile
SSQ	Spence Social Skills Questionnaire
TCAM	Traditional, Complementary and Alternative Medicine
TD	Typically developing
WHO	World Health Organization

1. Introduction

Dyspraxia (DCD) as defined within the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders version five (DSM-V)(American Psychiatric Association, 2013), involves an impairment of motor skills substantially below what is expected when taking into consideration a person's age and intelligence. The disorder significantly interferes with academic achievement and activities of daily living. It is a mystery to many people, including those from the medical profession, education and parents alike because it is difficult to clearly define what it is, how common it is, who it affects and how it overlaps with other disorders. Parents want to know if there is a cure and many ask whether they are responsible in some way for their child's condition and, if not, how it has occurred. All these questions continue to be the subject of rigorous scientific debate and enquiry. To confound matters, the terminology used to describe it has been an area which has always been problematic with consensus not yet being reached in all quarters of research and clinical practise. Over the years, terminology utilised has evolved, partly due to a heightened awareness and expectation for political correctness but also because of expert input from different fields of research and practice.

Dyspraxia/DCD symptoms are numerous but those with the condition can usually be recognised by their general clumsiness and poor posture. They will seem slower than normal achieving tasks such as dressing, getting ready for school and completing work. Handwriting will usually be poor, and reaching developmental milestones during childhood will be an issue which will often alert those, working or living with the child, that something is wrong. Those with the condition often demonstrate inappropriate behaviour and heightened levels of motor activity. Many will have inherent visual and sensory deficits which will impact other aspects of life. The Dyspraxia Foundation states that up to 10% of the population is affected and research suggests that, in at least 50% of those with dyspraxia/DCD, they will have overlapping conditions such as ADHD, autism and dyslexia. The impact of having dyspraxia/DCD is varied with the individual affected in areas of self-esteem, socialising skills, school life, family relationships and general wellbeing both in the present and future. No known cure exists at this time and the condition persists through to adolescence and adulthood. Early diagnosis is therefore recommended in order that maximum support can be offered to the individual and family so that the accompanying social, emotional and health consequences can be minimised.

The literature review of this thesis will explore many potential causes of DCD, namely genetic, environmental, neural, visual-motor and sensory-integration dysfunction. It will go on to review the two main categories of intervention which are currently used in its treatment. These are “bottom up”, or deficit orientated approaches, using methods such as sensory integration therapy, kinaesthesia and perceptual motor training, and “top-down”, or process-orientated interventions such as task-specific interventions, cognitive approaches and parent teacher interventions. The efficacy of these interventions will be discussed.

The review will also introduce the key areas of Complementary and Alternative Medicine (CAM), its prevalence, its efficacy, whether it is accepted and incorporated into the United Kingdom’s National Health Service and how improved dialogue regarding CAM can be fostered so that the NHS’ policy on “Patient Choice” can be fully realised. This topic introduces an important discussion relating to the subject of the research within this thesis, namely whether Fascia Bowen therapy (a non-invasive CAM therapy which involves stimulation of the skin and underlying fascia) could improve neuromuscular function and psychological wellbeing in boys between 8 and 11 years old, diagnosed with DCD, participating in the study. As fascia Bowen has never been tested for its efficacy, but is a derivation of Bowen Therapy, the background and efficacy of Bowen will be discussed as well as the mechanisms through which fascia work may potentially cause change in the body.

2. Literature Review

2.1. What is DCD/Dyspraxia

2.1.1. Signs of DCD

2.1.1.1. How to recognise a child with DCD from their symptoms

The Dyspraxia Foundation suggests that DCD is evident if there are generalized motor and perceptual difficulties and a demonstration of variable motor performance, sometimes observed by others as clumsiness (Dyspraxia Foundation, 2013) . In view of these, running patterns are usually awkward; falling over, and colliding with objects are frequent occurrences (Kirby et al., 2010). It is widely accepted that the persistence of primitive reflexes and immature balance reactions interfere with gross motor development (Dewey and Wilson, 2001, Schoemaker et al., 1994).

2.1.1.2. Poor Posture and Poor Fine and Gross Motor Control

Posture maintenance is notoriously poor in DCD (Fallang et al., 2005) and a child will be slow and hesitant in most actions. This results in notoriously poor performance in sporting activities, partly in view of the relationship which exists between slow reaction and movement timing (Henderson et al., 1992). Subsequent reduced participation in activities will result in the negative impact of decreased muscle force (Smyth, 1992).

Children with DCD will often drop things and struggle with hand dexterity (Kirby et al., 2010).

2.1.1.3. Slow Achieving Milestones

Parents often notice that their children appear slow in attaining developmental and motor milestones e.g. with some not able to sit independently by the time they reach 8 months. They may fail to crawl in stages like their peers, preferring, instead, to 'bottom shuffle' before walking (Green et al., 2008, Wilson and Larkin).

2.1.1.4. Slowness in Completing Tasks

They will demonstrate difficulties with organization, both within the individual's academic life but also at home and in situations requiring self-care tasks. A general slowness in speed will be evident, such as getting ready for school or in performing particular tasks like dressing, but additionally the children will demonstrate problems of accuracy in that they will be less precise than their peers.

2.1.1.5. Handwriting Problems

Well before they reach 3 years they will often avoid tasks requiring good manual dexterity skills because, in DCD, these are usually poor (2013, Flapper et al., 2006).

2.1.1.6. Messy Eaters

From infancy a child may continue to eat with their fingers rather than using a knife and fork because their grip will be poor. As a consequence of this method of eating they will become grubby very quickly. Their lack of manual dexterity and motor control will mean that they frequently spill their drinks (Missiuna et al., 2006).

2.1.1.7. Visual Difficulties and Sensory Deficits

Those with DCD have deficits in visual attention and visual-spatial perception (Cummins et al., 2005, Kagerer et al., 2004). There are often proprioceptive or kinaesthetic deficits as well as sensory motor execution challenges (Piek and Dyck, 2004, Asonitou et al., 2012). These problems, plus their internal representation of movements, are all implicated as potential reasons for clumsiness in DCD (Wilson et al., 2004). There is an absence of awareness of danger and they may fail to detect vehicles approaching at speeds of more than 22km/h which indicates a developmental immaturity in looming sensitivity in the children. This could explain why they make errors of judgment when crossing the road because they will often assume that approaching vehicles are in fact stationary. Research shows that children below 9 with DCD are four times more likely than adults to be involved in a road accident as pedestrians (Purcell et al., 2012).

2.1.1.8. Language Difficulties

According to the Dyspraxia Foundation finding the right words will often be a problem for children with DCD and some will stutter (Dyspraxia Foundation, 2012). Other research shows that while speech is one of the most sophisticated aspects of all motor skills many children who have DCD will have absolutely no difficulties in this particular area (Polatajko and Cantin, 2005). This difference could be influenced by the overlap with other disorders where speech and language is particularly prevalent (Gaines and Missiuna, 2007, Zwicker et al., 2012).

2.1.2. Formal Diagnostic Criteria

To simplify matters, within this thesis, communication on the topic will now be made using the DSM-V criteria because the DSM is the most widely accepted diagnostic reference tools used by professionals (European Academy of Childhood

Disability, 2011).The manual recommends the following DCD diagnostic criteria:

- For those failing to acquire both fine and gross motor skills in keeping with their chronological age and in situations when they are exposed to the same opportunities to gain motor skills as their peers
- That the motor skills deficits significantly and persistently interfere with activities of daily living in keeping with their chronological age
- That the symptoms appear from an early age
- When the motor skills problems cannot be explained by deficits in intellectual capacity, visual impairment or any movement related neurological condition e.g. cerebral palsy, muscular dystrophy, degenerative disorders (American Psychiatric Association, 2013).

To be classified as DCD, motor impairment must adversely affect some other aspect of the individual's life as well as their motor dysfunction e.g. their academic performance, participation at home, socially and within their community (Barnhart et al., 2003). In addition to the impact on aspects of daily living the impairment must not be caused by a neurological issue or as a result of conditions such as Cerebral Palsy, Hemiplegia, and Muscular Dystrophy, or as found in conditions involving low intelligence (Kirby, 2011, American Psychiatric Association, 2013).The World Health Organization (WHO) and American Psychiatric Association (APA), agree within their definitive criteria, using standardized motor impairment tests, that children with DCD will score two standard deviations lower than the mean and they will have a minimum IQ of 70 to fall within a diagnostic criteria. (Lingam et al., 2010, Cairney et al., 2008, Kirby and Sugden, 2007). Their motor function impairments must be greater than those found in children diagnosed with Learning Disability (LD) and the child should not have muscle tone disturbance, movements which are involuntary, or sensory loss (Barnhart et al., 2003).

2.1.3. Issues with Definition and Classification

2.1.3.1. Issues with DSM Criteria

The DSM has undergone several revisions since it was originally published in 1952. Accompanying these, a substantial increase in the numbers of individuals diagnosed with disorders has been reported and the number of diagnosed disorders has also tripled (American Psychiatric Association, 2013, Carey, 2008). In the case of DCD this increased incidence could be because many with the disorder have previously remained un-diagnosed. Another possible explanation is that the diagnostic criteria have been extended so that the threshold, for what is considered normal, has changed.

One of the former architects of the DSM, (version III), Robert Spitzer, voiced concerns about the medicalization of human symptoms, which he was instrumental in creating during his involvement with the DSM. This criticism particularly refers to the failure to take account of a vital component, namely the context within which symptoms occur (Spitzer, 2007). He also criticises the lack of transparency in the research underpinning the DSM (Cairney, 2010).

Cairney raises a number of areas of concern regarding the DSM criteria (Cairney, 2010). Its section A refers to significant impairment in motor skills but the DSM-V does not give a defined threshold for diagnosis; it could be anywhere between the 5th and 15th centile, and this is dependent upon the practitioner. The implication of this is that it presents a risk of being under or over inclusive. If the level is 5% then many children will not meet the diagnostic criteria but, alternatively, if the level is 15% then this would result in too many being diagnosed with DCD. Section B of the manual states that it is not sufficient to have motor impairment alone but that the condition must also have a significant impact on activities of daily living (ADL) or academic function. This raises the question regarding how it is possible to measure or to define ADL impairment as the DSM-V does not give a defined cut-off or measurement scale. The result of this is that estimated prevalence rates are variable.

The positive aspects of the DSM are that in terms of defining the disorder it is useful because it keeps the professional, who is in the position of diagnosing the disorder, focused because the diagnostic criteria are limited to just 4 areas.

In summary, the DSM remains a useful tool because it is open to interpretation. It is helpful in epidemiological research where it is imperative that a measurement of the criterion for a disorder must be available. However, the negative is that it is not helpful in terms of operationalizing and where measurement of core components of the criteria is concerned. It is worth noting that for the diagnostic purposes of those with DCD the DSM is only sensitive in the hands of a specialist already conversant with the disorder.

2.1.3.2. Terminological Inconsistencies

Dyspraxia is a common term used in the UK to describe children with motor coordination problems. Many other terms associated with this condition are used but this can be confusing to both lay people, health professionals and researchers alike (Magalhaes et al., 2006). The use of words and terms ranging from “Clumsy child syndrome”, now politically incorrect but widely recognised, “dyspraxia”, adopted by the Dyspraxia Foundation and “developmental coordination disorder (DCD)” are utilised. Some use dyspraxia interchangeably with the term developmental coordination disorder (DCD) but unlike DCD, dyspraxia generally involves immaturity in developing, organising and movement sequencing, while DCD is a more generalised form of motor coordination problems (American Psychiatric Association, 2013).

The lack of an internationally agreed classification for dyspraxia is confusing. Currently it does not appear as a named condition in The Diagnostic and Statistical Manual of Mental Disorders (DSM-V) but is grouped together with other conditions, involving more generalised motor coordination problems, under one official term, namely DCD (American Psychiatric Association, 2013). Many support groups and educationalists continue to use the term dyspraxia however and until there is an agreed classification there will always be some who maintain that there are major differences in the symptoms (Kirby et al., 2013) and that not all individuals with DCD will have dyspraxia.

The inconsistency in terms poses problems in identifying relevant scientific papers for research, e.g. the term clumsy child syndrome, now too politically sensitive to be used, was frequently utilised in the research literature for many years. Knowing about the range of terminology will permit systematic reviews to be conducted thus enabling international consensus to be reached about dyspraxia and DCD, how their symptoms differ and how they overlap. One systematic review conducted uncovered seventy-five search terms associated with Dyspraxia alone (Zwicker et al., 2013), demonstrating clearly that identifying one term encapsulating dyspraxia or DCD in their fullest senses will probably always prove difficult. Apart from search term difficulties, many scientific researchers and health professionals hold strong views on the subject of terminology, maintaining a position that a clear differentiation exists between dyspraxia and DCD because they have different symptom profiles. Some believe that dyspraxia cannot be seen as falling clearly within a diagnosis of DCD for the same reason (Dewey, 1995, Henderson and Henderson, 2003, Blank, 2012, Gibbs et al., 2007). Miyahara proposes that a distinction exists between dyspraxia and DCD because motor sequencing and selection primarily refer to dyspraxia and that these issues are not always exhibited in children with DCD (Miyahara and Mobs, 1995). What is certain is that if dyspraxia is to be included within a diagnosis of DCD then the individual must experience difficulties with their everyday motor skills as this is DCD's main feature (European Academy of Childhood Disability, 2011).

2.1.4. Prevalence

The prevalence estimates for DCD are somewhat confusing and varied; however the American Psychiatric Association (APA) suggests that prevalence estimates lie between 5%-15% in the primary school population when no other neurological conditions are present (American Psychiatric Association, 2013). Some estimate that this figure, in children, falls within an even broader range between 3% and 22% (Piek et al., 2006, Martin et al., 2010). However, this figure is often confused due to issues of comorbidity, gender and methodological issues as discussed below. The most recent DSM-V suggests that the prevalence rates are between 5%-6% for children between 5-11 years (American Psychiatric Association, 2013) and that the identification of DCD is made using a child's historical record developmentally, the medical record, physical examination, school reports and individual assessments utilising sound psychometric standardized tests which are culturally appropriate.

One of the first studies to use strict criteria to define UK DCD prevalence involved a population survey of more than 7000 children who were assessed for manual dexterity, ball skills and balance. Using the Avon Longitudinal study of parents and children coordination scoring system, severe motor coordination problems were identified. Additionally, handwriting tests and activities of daily living scales were utilised to quantify the implications suffered in daily life as a result of motor coordination problems.

An added dimension potentially influencing the reporting of prevalence is gender. Literature indicates that boys are affected more than girls and this is confirmed in the DSM-V (American Psychiatric Association, 2013). Reasons for this could be due to boys' more apparent behavioural manifestations as a result of the comorbid presence of ADHD as reported in the large population survey by Lingam (2009). Comorbid ADHD and DCD tends to be more severe in manifestation than if each disorder occurs alone (Watemberg et al., 2007). The ADHD component results in differences in the predominant symptoms, e.g. with girls tending to internalize their symptoms of inattentiveness and any associated comorbid obsessive-compulsive disorder and perfectionist behaviours, all of which mitigate symptoms and delay referral for diagnosis by parents or teachers. Boys with ADHD co-morbidity, on the other hand, tend to externalize predominant symptoms such as hyperactive behaviours and they subsequently display more covert aggression which can be identified more easily by teachers and parents who are around them (Quinn and Madhoo, 2014).

Another possible reason for gender prevalence differences could be due to the characteristics of the tasks used to assess coordination issues. Girls are generally more proficient in activities demanding finer coordination skills and boys are more proficient in activities requiring grosser movements or strength differences; the tests emphasizing finer motor skills would highlight males and the tests emphasizing gross motor skills would identify females. Reported gender prevalence rates vary from 2:1 to 7:1 (Kadesjo and Gillberg, 1998, Barnhart et al., 2003, Lingam et al., 2009, Kirby et al., 2013) (Cermak and

Larkin, 2002). The DSM-V also states a ratio in keeping with these studies' findings although there are no clearly identified definitions or guidelines indicating on what the data is based.

Girls need to demonstrate a significantly poorer set of movement problems than the boys in order to be identified by their teachers. This could be due mainly to the behavioural differences between the genders in class and the girls' internalisation of their problems (Quinn and Madhoo, 2014) despite the presence of co-morbid conditions (Missiuna et al., 2006), or due to the gender differences established over time due to perception, gender role-identification where the child imitates, socialisation as developed when exposed to peers, teachers, parents and coaches, and self-socialisation (Thomas and French, 1985).

To summarise therefore, from the information provided above it is apparent that DCD prevalence rates vary greatly, which can become confusing to any reader. The differences could be as a result of reporting, the use of different assessment criteria and tools as well as how these are accounted for. It could also be due to the differences in the severity of conditions and how stringently the diagnostic criteria are applied; cultural differences and environmental causes could also be significant factors (Cermak and Larkin, 2002, Blank, 2012, Thomas and French, 1985). The best estimate would be to focus on the most commonly held view on prevalence rates and this figure would be between 5-6%. However, the reader must always bear in mind that, for a number of reasons, broader ranges may be represented in literature.

2.1.5. Comorbidity

Statistics suggest that motor coordination problems are reported in a third of girls, boys and adolescents with ADHD (Fliers et al., 2011) but it is a distinct disorder and not one which is solely a conceptualisation of a group of symptoms that often appear in other disorders or syndromes. ADHD is the most frequently co-occurring condition, seen in approximately 50% of DCD cases, according to the DSM-V. Dyslexia and Autism Spectrum Disorders (ASD) have a particularly high co-morbidity with DCD, but not as high as in ADHD (Gillberg, 1998, Gillberg and Kadesjö, 2003, Gillberg et al., 2004, Fliers et al., 2012). Studies suggest that identifying a child solely with motor difficulties will be the exception rather than the rule (Kirby et al., 2013) because DCD almost always overlaps with other developmental disorders. As with High Functioning ASD (Green et al., 2002, Yeo, 2006), one third of children with DCD will probably also have speech and language impairments (Kirby et al., 2013).

In view of this high prevalence of co-occurring motor coordination issues it is surprising that greater attention is paid to other co-existing conditions within ADHD, as opposed to DCD. It is possible to differentiate between the two because DCD is intrinsically a movement disorder while ADHD is a disorder of attention. One study concentrating on parent and teacher ratings of motor coordination problems in children and adolescents with ADHD, found that motor coordination problems occurred in approximately one third of the children (Fliers et al., 2011). Those children with problems of fine as well as gross motor skills, coordination skills and motor control were all related to inattention instead of hyperactive or impulsive symptoms. In relation to the control participants the motor coordination issues in ADHD remained present in teenagers according to the parents; teachers estimated that the prevalence diminished but this may be due to factors such as ability to hide their problems by non-participation. Both genders were comparably affected but the motor performance was better in girls than boys within the control group (Fliers et al., 2008, Fliers et al., 2011).

While children with ADHD and ASD do show basic motor control impairments, the impairments particularly in performance and in the detection of skilled motor gestures in accordance with DCD, appear specific to autism (MacNeil and Mostofsky, 2012).

2.1.6. Non-motor Difficulties Associated with DCD

2.1.6.1. Introduction

The research which is the subject of this thesis not only measures motor issues associated with DCD but it also measures the non-motor issues such as social interaction, scholastic function, self-esteem and behaviour.

There are many non-motor difficulties associated with DCD. These include behavioural issues such as impulsivity and oppositional behaviour (Gillberg and Kadesjö, 2003), emotional issues (Ahern, 2000), low self-esteem (Piek et al., 2005), poor self-perceived competence (Mandich et al., 2003), anxiety (Skinner and Piek, 2001), depression (Gillberg, 2003), bullying (Mandich et al., 2003), and obesity (Cairney et al., 2005). Research indicates a growing interest in the awareness that children with DCD are often at risk of developing a variety of psychosocial difficulties such as educational under-achievement (Dewey et al., 2002, Henderson and Hall, 1982, Watson and Knott, 2006). Often this is because they are slower in completing tasks than their peers. Additionally, their problems interacting with others, both in the playground and class, are well documented (Missiuna et al., 2006) with one reason being that they have a heightened fear of failure.

2.1.6.2. Social Skills and Playtime

Children with DCD demonstrate slowness and clumsiness in performing tasks and consequently often become isolated from their peer group in which they will ‘stand out’ as being different and less competent. This will ultimately manifest in a lack of ability to integrate with their peer group and they will spend more time alone as onlookers rather than as participants in social physical play (Smyth and Anderson, 2000). Regardless of the cause many children with DCD will often prefer the company of adults to children (Van Waelvelde et al., 2004, Utley et al., 2007, Bart et al., 2011) as this type of engagement would not require them to participate in playground activities. The children's limited involvement in any social activities (Poulsen et al., 2008) because of their self-perceived inability to succeed alongside others will subsequently result in feelings of isolation and anxiousness both at school and in the wider community where they live (Chen and Cohn, 2003).

A study investigating leisure time physical energy expenditure in boys between 10-13 years, with and without DCD, was conducted using 173 participants (Poulsen et al., 2008). Psychological mechanisms of self-concept appraisal potentially involved in influencing physical activity and energy expenditure were also measured using a Self-description Questionnaire-I. Participants were matched for school year level, chronological age and socioeconomic status. Sixty boys had a diagnosis of DCD and 113 boys with non-DCD were allocated to the comparison group. Those with DCD were split into two groups according to their coordination symptom severity, as measured by the MABC test, and the groups were named 'moderate' and 'severe'. Those in the comparison, non-DCD group, were allocated to two further groups, dependent upon medium or high physical coordination ability as assessed by the MABC test. The children in the high group were ranked as a result of their 50th percentile or above score in the MABC test and the terms 'medium' and 'high' were applied to these two groups but only used when referring to the non-DCD groups. The study utilised a descriptive question to establish differences between self-concept and the boys' energy expenditure levels while performing activities during their free time. Information regarding the frequency of their participation in activities outside of school hours and any structured, non-structured free-time pursuits that they followed socially and non-socially were gathered by parents who completed a 7 day diary of activities. These were measured in blocks of half an hour for 7 days before school. After-school activities were measured, during the same 7 day period, in 14 half hour blocks. The recorded information accounted for intensity and duration of physical activity and also included information regarding social environment. Intensity of activity information was completed using a measure which permitted differences in components such as heart-beat, breathing, sweating, movement and feelings of exhaustion to be reported.

To investigate potential relationships between physical co-ordination ability and energy expenditure the researchers hoped that this would establish whether a child's self-concept could be a mediating factor in the relationship between physical ability and energy expenditure. Also investigated were the general self-concept and domain-specific self-concept perceptions involved in peer-relations, parent relations, physical ability and physical appearance, as mediators of relationships occurring between physical coordination ability and the expenditure of energy.

Variance analyses were used to establish whether there were differences found in the energy expenditure and self-concept perceptions. Mean differences between groups were analysed for energy expenditure, and non-academic self-concept perceptions were compared across the four groups. Post hoc analyses were conducted to measure how different means compared for the different sized groups.

The results showed significant differences between the DCD and non-DCD groups but non-significant between the two DCD groups or the two non-DCD groups. Additionally, two steps were performed in the mediation analysis which tested relationship strength between physical coordination ability and energy expenditure, one with and one without the self-concept mediators included in regression equations. The first step minus the self-concept mediator inclusion in the analysis demonstrated that all energy expenditure variables showed a significant association with physical ability. However, with the second step only one relationship showed significance and this was that strength of relationship between physical coordination and physical energy expenditure showed a significant reduction when peer-relations self-concept was included within the equation.

The clinical implication of this result is that OTs ought to take into consideration the self-perceptions of social competence of their patients in addition to the physical characteristics before allocating the interventions appropriate for the individuals because consideration for social and physical contexts using supportive, motivational, cooperative and non- competitive goals will help to improve the participation of boys with DCD.

2.1.6.3. School Performance Difficulties-Identification and Referral Problems

Teachers who work closely with a child are the most likely to notice how motor coordination problems impact the child's progress at school (Missiuna et al., 2011). One research study conducted over a 2 year period with children between the ages of 5-8 investigated their developmental clumsiness and how their poor motor coordination affected their school progress. Those children, identified by the teachers as having clumsiness, were found to score significantly poorer in comparison with the control group using the measures for motor capability.

Additionally, they had more frequently occurring educational and social issues as a result of their clumsiness in the playground and in their motor function issues in classwork (Henderson and Hall, 1982).

Academic underachievement is well documented in DCD (Barnett and Wiggs, 2012) due to the motor coordination issues and this tends to increase with the severity of the motor impairment (Wocadlo and Rieger, 2008). Handwriting and drawing problems in schoolchildren are often early indicators of DCD for teachers once the child is established in school because the quality will often be very poor, barely legible, and drawing skills will be demonstrably immature in style (Barnhart et al., 2003). Children's difficulties holding and using both pens and pencils to draw and write as well as the use of scissors in creative, craft-based lessons will also be evident very early on in the child's academic life (Chang and Yu, 2010). In this one study handwriting and reading difficulties for children with DCD, when compared with typically developing (TD) children, were found to contrast significantly.

2.1.6.4. Inappropriate Behaviour and Heightened Levels of Motor Activity

Children with DCD will find difficulty in judging how to behave in company, suggesting that they have difficulty with perception. Often they become easily upset, agitated and with a tendency to outbursts of temper and heightened levels of motor activity. However, according to research, there are many variables which could be involved in influencing their emotional behaviour, such as parenting methods as well as overlapping developmental conditions (Campbell, 1995, Degnan et al., 2008).

2.1.6.5. Self-worth, Anxiety and Mental Health

Children with DCD have motor skill problems that impede the acquisition of that their functional and academic life (McWilliams, 2005). If they are unable to perform well in their academic or sporting interests then this impacts severely on their self-esteem (Piek et al., 2006).

By the time that a child attains pre-school age (i.e. 3-5 in the UK) if the DCD has not been identified then the child can be affected in different ways, e.g. displaying an increased frustration with their own inability to do things. One reason for this is that motor skills execution requires significant energy expenditure. Resulting tiredness can induce a child to manipulate his environment thus avoiding participation in situations which highlight motor problems or which demand that he undertakes further motor tasks (Missiuna et al., 2011).

As the child gets older and becomes more involved in self-care tasks the motor problems manifest in difficulties with dressing generally, and particularly when buttoning clothes (Piek et al., 2006). Within DCD the inability to perform tasks efficiently can lead to anxiety and lowered self-esteem, and consequently this impacts the mental health and wellbeing of the child (Cummins et al., 2005, Polatajko and Cantin, 2005, Green et al., 2006, Watson and Knott, 2006, Bart et al., 2011, Lingam et al., 2012, Hill and Brown, 2013).

Self-worth perception is believed to develop in the early and middle childhood years (Wigfield and Eccles, 1994) and this can play a major role in things such as enjoyment of activities. If a child has negative self-worth then its subsequent effect can be to impact on the mental health of the child (Cairney et al., 2007).

As discussed, many studies have found that children diagnosed with DCD also have co-occurring mental health problems. One study was conducted to assess associations between children diagnosed with probable DCD at age 7 using the DSM-IV-TR (Lingam et al., 2012), and mental health problems. It was found that the children with DCD in the study did have more depression than normally developing children.

However, conclusions drawn showed that when the mediating variables such as bullying, low self-esteem and friendships were accounted for, it was apparent that children with DCD were no more likely to have mental health issues, such as depression, than the controls. This means that focus on interventions to increase self-esteem, dealing with bullying and assistance for the children to help with their social interaction would reduce their risk of developing depression.

A study investigating children at play explored the interaction between the difficulties often experienced by children with DCD engaging in age-appropriate play and the subsequent impact on self-esteem. They found that those with DCD were generally less active, choosing to use play equipment less frequently and spending less time interacting with other children due to their inability to keep up. Additionally, they avoided particular situations which demanded a demonstration of their lack of physical coordination and competence. This type of behaviour in the child with DCD demonstrates that fear of failure generates more withdrawal, and a vicious circle of avoidance and social isolation ensues (Schoemaker and Kalverboer, 1994, Skinner and Piek, 2001, Harter, 1985). Another consequence of this is that lack of playtime or athletic involvement for children with DCD means that they miss opportunities to benefit from vital peer group interaction which children need in order to thrive as well as what they could gain in terms of physical and social benefits of athletic participation (Bouffard et al., 1996, Piek et al., 2006). Children as young as 5 with DCD are known to assess and measure their own competence by comparing themselves with their peers (Horn and Hasbrook, 1987) and research shows that low self-esteem may be present in children as young as 6. Schoemaker's study (1994) found that correlations exist between social measures and affective functioning. Interestingly, it was highlighted that anxious children scored lower on social acceptance and this may have been influenced by shyness and insecurity impacting on their ability to communicate with peers. Teachers' questionnaires revealed that introversion went hand in hand with negative task orientation. This suggests that children who were isolated or insecure would also have difficulty concentrating during their classroom sessions. Children demonstrating positive orientation towards tasks were likely to demonstrate less negative behaviour in the social domain (Schoemaker and Kalverboer, 1994).

Piek et al examined the impact of fine and gross motor abilities on self-perceptions in males, females and adolescents with and without DCD, and found that the level of ability in movement impacted self-perceived athletic capability and scholastic competence. Children with DCD display deficits in fine or gross motor skills but some display deficits in both areas. In the study, those with greater self-perceived athletic competence were younger and were mostly male with better gross motor capabilities. Conclusions drawn by the study were that for boys, their self-worth is based upon their perceived ability to perform well in athletic activities mainly requiring gross motor skills rather than their perceived academic capability and that they are more impacted if they have DCD in comparison with the controls despite equal importance being placed upon perceived athletic competence and self-worth in both groups. Therefore, the greater their gross motor problems and perceived athletic competence, then the more damaging will be the impact on their self-worth. Another possible factor influencing this could be that males may be highly critical of their own athletic ability because sport and the performance of elite athletes are highly advertised in the media of western societies (Piek et al., 2006). Therefore, boys with motor problems may suffer a greater impact on their perceived athletic competence as a result. In girls, both in the DCD group and in controls, self-worth is based upon their perceived ability to perform well in academic activities which require fine motor skills. Therefore if their perceived fine motor skills are poor, then this will impact more negatively on their self-worth. However, for females, perceived athletic competence, as a measure of self-worth, was also considered important to those with DCD, meaning that they are at greater risk of having psychosocial difficulties. Conclusions drawn suggest that girls are at greater risk of psychosocial implications if they have DCD. The study highlights that other studies' findings report conflicting results regarding self-worth and perceived competence between males and females. The implications are therefore that there is a need to assess particular types of motor deficits when designing specific intervention strategies for children who have motor disorders, especially in those occurring in the academic setting; it is important that the type of motor problems i.e. whether fine or gross or both is determined and that they are assessed before evaluation of self-worth findings takes place (Piek et al., 2006).

Together, these studies on self-worth in DCD show that children with the disorder should be screened for mental health issues as early as possible. In addition to this, interventions should be concentrating on ways to develop positive self-esteem, addressing problems of bullying and developing techniques to improve their social interaction. As a consequence, the risk of depression and behavioural problems would be significantly reduced.

2.1.7. Causes of DCD

2.1.7.1. Introduction

The specific causes of the condition are still unknown. However, it does seem to be related to disruption in the method of brain message transmission to the body. The results manifest as a curtailment of smooth, coordinated movements. The DSM-V states that DCD is a developmental condition that is defined under the heading of Motor disorders (American Psychiatric Association, 2013). In the DSM-V it states that the motor deficits cannot be explained by intellectual disability and neither is it a visual impairment or a neurological condition such as cerebral palsy, muscular dystrophy or degenerative disorder. Over recent years interest has been re-established in the investigation of the underlying aetiology (Gibbs et al., 2007).

2.1.7.2. Genetic and Environmental Causes

Based on studies with family and twins it is suggested that both ADHD and DCD have a genetic background (Fliers et al., 2011). One genome-wide association study was conducted to identify genes contributing to brain function and motor coordination problems in children with ADHD. While the results did not reach genome wide significance the study implicated the genes involved with neurite growth and muscle function. The genes ranked highest in their findings were MAP2K5 (which is a protein kinase gene with a molecular location on chromosome 15) identified in restless leg syndrome (one of the symptoms of DCD) and CHD6 (which is a helicase protein gene located on chromosome 20) identified as causing problems in motor coordination in mice. The study also found small associations for 15 SNPs (single nucleotide polymorphisms which are the commonest type of genetic variations among people. They can influence disease susceptibility). The study offers clues about the potential genetic aetiology of motor coordination dysfunction and provides us with a good base upon which to conduct further research (Fliers et al., 2012).

Current research and understanding of ADHD, which has a high co-morbidity with DCD, and other developmental disorders suggests that gene research is highly unlikely to lead to the conclusive identification of single genes as causing the disorder. As each gene's effect may vary in strength and influence (Kirby and Sugden, 2007) it is more likely to conclude that a combined interaction between gene and environmental factors will influence the externalisation of disorders (Pearsall-Jones et al., 2009).

Neural

An imbalance caused by the neurotransmitter dopamine within the neuronal circuits of the basal ganglia and cerebellum, which are regions related to movement instigation and balance, is thought to be a critical factor in DCD. Dopamine is already known to be involved in the exploratory, motor and other extra-personal functions which are located within the left hemisphere and children with DCD demonstrate right hemisphere disconnection or insufficiency (Zwicker et al., 2009, Fliers et al., 2011). Research also demonstrates that the basal ganglia are involved in motivation, voluntary motor control and learning of habitual behaviours, while the cerebellum is involved in control of motor movement and coordination, balance, equilibrium and muscle tone. The latter is closely linked with the vestibulum and vestibular nuclei involved in eye movement control and postural control, all of which are compromised in children with DCD who struggle with hand-eye coordination. Dysfunction of the cerebellum is reportedly a dominant factor in the neuropsychopathology of DCD and ADHD and this is known following extensive laboratory experiments with rats, cats and studies with humans (Flouris et al., 2005, Zwicker et al., 2009). These have demonstrated that the cerebellar cortex develops late in the last trimester of pregnancy in humans and continues its development for a year after birth of the baby (Gramsbergen, 2003). The same region in the rat brain is as developed as the human brain only two weeks after its birth and this is why it is possible to draw comparisons, because the rat brain can be studied post-natally for early phase neurodevelopment. Rats and humans, while very different, can be compared due to the ability of rats to manipulate objects while standing on their two hind legs, although account must be taken regarding differences in motor competences and repertoires. It has been suggested that any delays in the maturation or dysfunction of the basal ganglia, parietal lobe and the cerebellum are a leading source of neuropathology in motor coordination issues (Zwicker et al., 2009). Studies conducted with rats and pigs in the 1970's suggest that under-nourishment in the latter stages of development and post-natally has a profound effect on physical brain growth, weight and functionality of the cerebellum specifically. As a consequence, rats were unable to run efficiently and coordinate in a maze compared with their controls (Smart et al., 1973).

As children with DCD have neurological soft signs such as hypotonia, a state involving low muscle tone, this can indicate that there is a problem anywhere along the neural pathway which controls muscle movement and whose cause can be a pointer that difficulties have occurred during brain formation (Fenichel, 2008).

In summary, we understand that various brain structures are involved in motor control, posture, balance and movement instigation and that dysfunction in the cerebellum in particular has been cited as a dominant factor in DCD neuropsychopatholgy. This thesis proposes that stimulating the body in a particular manner using fascia Bowen therapy may impact these brain regions, because it effects changes firstly in the neural pathways which lead to these regions. It is proposed that effecting changes in dysfunctional regions like the cerebellum may lead to improvement in the motor capabilities of children with DCD and therefore this, in turn, will lead to an improved quality of life in the children.

2.1.7.3. Visual-Motor Integration Difficulties

Studies have been conducted to test theories about the link between children with low mobility and lower visual-motor integration abilities but with unaffected perceptual skills. What this means is that the information being received is not faulty but the way in which it is integrated within the individual, to make sense of the information, is dysfunctional. Much of the research, however, focuses on the analysis between three domains, namely perceptual ability, visual-motor integration and motor development (Bonifacci, 2004). For an individual to conduct any complex motor pattern the central nervous system (CNS) must have the ability to process any information it receives from afferent nerves both quickly and efficiently. As soon as visual stimuli are received the appropriate brain region will be activated so that it permits the individual to perceive where the body is in space and where it should go. This, accompanied by an adequate degree of alertness involving the activation of the reticular formation to an optimal degree, then informs the CNS. If anything is dysfunctional in this process then any resulting planned movement will not be performed smoothly or correctly (Nelson and Pataki, 2015). In view of the acknowledged physiological link between perception and complex motor behaviour (Biguer et al., 1984), for the individual to undertake reaching and grasping moves for example, as in picking up a pencil to write with, a processing of form and texture plus distance and orientation characteristics of the object must take place (Chieffi et al., 1993, Bonifacci, 2004) and these studies provide useful evaluation of perception’s role when coupled with integration of visuo-motor qualities and general cognitive functioning in children with low motor abilities.

2.1.7.4. Sensory Integration Dysfunction (SID)

The theory of Sensory Integration Dysfunction (SID) differs from visual-motor integration theory because SI refers to all the sensory information received from the environment such as sound, taste, proprioception etc. while visual-motor integration theory refers to visual stimuli and movement and how they are both integrated. SID to is believed to provide an explanation for DCD because co-ordinated movements are reliant upon the correct integration of sensory information received from within the body or from the environment (Center of Development Pediatric Therapies, 2014) and this ability to integrate information effectively is dysfunctional in DCD. According to diagnostic criteria we know that children with DCD have difficulties with fine motor skills, balance, movement sequencing and co-ordination (Bundy et al., 2002, Gibbs et al., 2007).

Sensory integration (SI) theory was conceptualised by an occupational therapist called A. Jean Ayres (Ayres, 1972b). She referred to SI as the manner in which all types of sensory information are processed via neurological processes that receive, register, modulate and organise the incoming information to the brain. This process enables sense and a cohesive representation to be made of the individual’s surroundings. This corresponds with statements by the Dyspraxia Foundation suggesting that individualised, special brain functions, as well as joint functioning requirements, are required for the individual to make coherent sense of incoming stimuli. The capacity of both hemispheres to communicate efficiently seems to be deficient in children with dyspraxia/DCD indicating that there are sensory integration dysfunction issues present (Tallet et al., 2013, Dyspraxia Foundation, 2014). Tallet et al (2013) conducted a study to measure lateralized inhibition of symmetric movements in children with DCD when compared with their typically developing (TD) controls. This involved the children synchronizing a tapping beat with a metronome using one finger on each hand. It was then followed by a request to stop tapping their left hand finger while continuing to tap the finger of the right hand. Whilst both groups improved in their capacity to inhibit the tapping with the left hand finger the controls were significantly better in their improvement than the children with DCD who still exhibited persistent difficulties in their capacity to inhibit the left finger tapping even when age related differences were accounted for. The study highlighted that during normal development there is a progressive improvement in the ability of the two brain hemispheres to communicate but that this communication capability is either absent or delayed in children with DCD (Tallet et al., 2013).

Ayres stated, in her research with children from a number of different groups with developmental and behavioural disorders, that as the sensory system pathways develop over a period of time, (just as language and motor skill capabilities do), that problems can occur which leave the sensory system deficient in areas such as visual-spatial organisation, sense of movement and/or the positional sense (Piek and Dyck, 2004, Zimmer and Desch, 2012). This deficiency subsequently results in the incomplete maturation and processing of functional skills such as motor, coordination, auditory, vestibular and proprioceptive capabilities (Zimmer and Desch, 2012).

Individuals with decreased SI abilities i.e. in registering and processing sensations, have difficulty producing appropriate actions (Bundy et al., 2002). Using a compatibility-incompatibility paradigm and different sensory modalities, patterns of choice reaction time in participants between the ages of 6-7 and 9-10, with and without DCD, were explored in one study (O'Brien et al., 2008). All the younger children with

DCD were slower in their reaction to visual and vibrotactile stimuli than their typically developing counterparts and there was an even greater discrepancy evident between the older children with and without DCD, suggesting the existence of a developmental problem. However, the younger children with DCD responded much more swiftly when they received an auditory stimulus than their non-DCD counterparts, suggesting that children with DCD rely more heavily on the auditory stimulus to help them adapt to their environment. This faster auditory response may not be helpful in actions requiring motor planning and this could provide an explanation for poorer planning and timing issues in those with DCD.

One of the most important features of early development is the ability to process tactile information, and a discrepancy in this area of functioning suggests that there is a dysfunction which is related to somatosensory function, including a decrease in the child’s capability to process touch stimuli (O'Brien et al., 2008). Sensory integration theory posits that helping the individual to become more aware of their body in space and time will allow them to accrue knowledge about how movement can feel more beneficial to them. Their ability to plan a series of movements will be compromised and they will have difficulties sensing similarities and differences between sensations (Miller and Fuller, 2007). All of these problems are prevalent in DCD (Dyspraxia Foundation, 2012). As children with DCD do not simply recover or outgrow their problems, an intervention aimed at effecting an improvement in their vibrotactile processing may also prove successful at enhancing their motor coordination (O'Brien et al., 2008).

Many researchers have investigated the relationship indicators of SI and the occupational performance of children (Ahn et al., 2004, Baranek et al., 2002, Bar-Shalita et al., 2008, Bundy et al., 2007, Dunbar, 1999, White et al., 2007) with many finding significant differences. Using measures such as the Sensory Profile measure, subjects with motor processing difficulties and activities of daily living (ADL) issues have been found to be significantly different in their Sensory Profile scores compared with those with atypical Sensory Profile scores. Findings suggest that children identified with difficulties in sensory processing are also likely to have challenges in performing everyday tasks (White et al., 2007, May-Benson and Koomar, 2010) as is the case in DCD. Importantly, the hallmark of individuals with dysfunction of sensory processing is the chronicity of the sensory difficulties suffered and their impact on everyday life. These are also particularly evident in DCD whose named symptoms overlap significantly with those stated for SID (Miller and Fuller, 2007). Not only do the sensory processing deficits curtail the individual's control over the body but they also curtail the individual's potential to learn and develop effectively (Miller and Fuller, 2007).

Proponents of SID have campaigned for its inclusion in the DSM as a diagnosed condition for more than ten years. However, it was not included in the DSM-V in December 2012, mainly because there is insufficient evidence to recommend it according to the American Academy of Pediatrics (AAP) (American Academy of Pediatrics, 2012) The AAP's recommendation is that paediatricians do not diagnose SID as an independent diagnosis but that they should consider diagnosing other developmental disorders instead, e.g. DCD, anxiety disorder, ADHD, autism spectrum disorders and attention deficit/hyperactivity disorder.

It is apparent therefore that not everyone agrees that it is an independently diagnosable condition, but SI theory does offer useful explanations for behaviours while at the same time providing guidance about the most favourable intervention programmes which would assist health professionals to treat SI problems (Bundy et al., 2002). Research is increasing in this area, however, and systematic reviews are being published on SI's effectiveness as an intervention for sensorimotor skills and motor planning issues, socialisation, attention, behaviour regulation, activities of play and participation, reading and writing issues plus goal accomplishment (May-Benson and Koomar, 2010), all of which are often found in DCD.

2.1.7.5. Cerebellum

Only a limited amount of literature exists in relation to the neurobiology of potential correlates of DCD (Zwicker et al., 2009). The evidence available tends to focus on what is the most likely hypothesis to explain its aetiology but also which brain centres are more appropriate candidates implicated in the condition. The cerebellum has long been implicated as an important motor control structure (Pope and Miall, 2011) because studies involving lesions of the cerebellum have shown a subsequent impairment in movement and coordination in the subjects. With the increased use of neuro-imaging techniques the role of the cerebellum, in terms of motor-based processes, has been posited and corroborated experimentally (Ito, 2011). The development of the circuitry in the cerebellar cortex takes place during the final trimester of pregnancy and continues up to a year after birth so it is therefore vulnerable to nutrient deficiencies occurring following placental dysfunction or drug treatments as demonstrated using rat samples. Additionally, damage to the cerebellum can result from application of cortico-steroids post-natally as referred to in the literature review (Gramsbergen, 2003). Delays or dysfunction in the maturation process of the cerebellum are thought to be a leading source of neuropathology in motor coordination issues as evidenced by the poor performance achieved in tests of cerebellar function by children with DCD. However, this is an interpretation of association data, and it cannot be concluded that the cerebellum is the cause of motor problems – for example, in the finger-to-nose touch test where the individual is constantly missing the desired end trajectory, in attempts to perform rapid alternating hand movements, and in balancing and learning new skills (O'Hare and Khalid, 2002). Performing a full series of movements consists of communication fluency between the whole of the cerebral cortex and this includes the visual or acoustic regions of the parietal lobe where images stored there are retrieved. This is followed by the transfer of information taking place via the corpus collossum to the right motor cortex if the designated movement execution will be conducted by the left side of the body, for instance (Marien et al., 2014). In children with DCD there are sensory processing issues because they are known to have dysfunctional communication capabilities involving the sensory information passing between the right and left hemispheres (Tallet et al., 2013) and they have difficulties in the domain of visuo-motor function (Cummins et al., 2005) where they overshoot a planned trajectory. A monograph published by Luciani as early as 1891 detailed a list of cerebellar symptoms, namely muscle tone loss, muscle strength loss and the loss of movement continuity, but additionally he included poor movement co-ordination (Manni and Petrosini, 1997). Normal movement, in healthy people, demands coordination taking place in time and strength and these involve contractions of different muscle types at different joints so that the resulting movement process is smooth and efficient with a similar, smooth ending to the trajectory (Wolpert et al., 1998, Pope and Miall, 2011). Those with cerebellar dysfunction show irregular movement patterns, over-shooting, over-correcting and over-shooting again. All of these take place around the intended movement trajectory end point. A good example of this is the deficiently executed finger to nose test by individuals as referred to above; individuals with DCD have compromised ability in this task. These issues implicate the cerebellum as a vital structure in particular to joint and limb-coordination but also in hand-eye coordination (Dewey and Tupper, 2004) which is required in various tasks including gait. Studies using functional imaging techniques have demonstrated the deficiencies in motor coordination in eye-hand tracking tasks becoming obvious when subjects must follow a moving target with their eyes while simultaneously moving a joystick. Brain regions in the lateral hemisphere involved in independent hand control and eye are modulated by the extent of the timed-coordination taking place between the hand and the eye (Miall et al., 2001). Neuro-imaging studies have demonstrated changes relating to learning taking place in the same locations of the cerebellum as participants become more conversant with a difficult motor task practised over a period of a week (Miall et al., 2001). While an individual demonstrating cerebellum dysfunction produces erratic and slow movements involving mid-course adjustments they can still initiate movement sequences as well as deciding which movements to undertake next. This again implicates the cerebellum in movement initiation and in the calculation of which movements to initiate, but also in adjustments required during movement itself. All of these stages are compromised in DCD (Dewey and Tupper, 2004, Pope and Miall, 2011). This is further supported by research demonstrating that individuals with cerebellar dysfunction display problems in their ability to adjust eye-hand coordination in throwing tasks while simultaneously adapting to viewing the world through laterally displacing prisms when compared to their TD peers (Martin et al., 1996a, Martin et al., 1996b, Pope and Miall, 2011). These are tasks which are also compromised in DCD. Cerebellar function studies suggest that the cerebellum is involved in adjusting the commands for movement so that in effect it is synonymous with an error-detecting mechanism. Marr and Albus (Marr, 1969, Albus, 1971) stated that the cerebellum is vital in learning motor skills and adaptation of motor commands as skills, and that when these are repeated through experiences eventually they result in a reduction in performance errors. The theory of the cerebellum's functions offered by Mar and Albus, despite their presentation over 40 years ago, still dominate in the field of motor function theories (Pope and Miall, 2011).

Studies which present motor control theories for the cerebellum suggest that it is a learning centre for automated motor skills which include the ability to predict sensory action consequences or to predict movements which are required for goal achievement (Bastian, 2006). Additionally it is suggested that the cerebellum has a comparison mode which detects any incompatibility between a predicted and actual movement and this learning capability of this process uses any error input information it receives to compare information it already has stored so that actual movement is conducted swiftly and accurately (Pope and Miall, 2011). It is well-recorded that in DCD movements are not swift and efficient but instead that one of the main presenting symptoms of the condition is clumsiness (Hyde and Wilson, 2011).

When the cerebellum functions efficiently an individual is able automatically, and without thinking, to coordinate muscle actions, joints and the bones involved in movement. However, when it is dysfunctional, as it is in DCD (Mima et al., 1999, Geuze, 2005, Marien et al., 2014), it is only possible to conduct simple movements, and coordination is not possible. Critically, therefore, the cerebellum's role is to combine the actions of muscles so that these work together towards a common goal without the necessity of thinking about them.

In summary therefore we know that the cerebellum has long been implicated as an important structure in normal motor control, as well as in the pathology of motor control. Based on this, it has also been implicated specifically in DCD. Damage to the cerebellum is likely to be occurring during its early developmental stages within the last few months of pregnancy and up to a year post-natally. The cerebellum is capable of learning due to the fact that it carries many different kinds of information relating to internal and external conditions within an individual's body and stores it for later use. Because of its store of information it has adaptive capabilities, such as an ability to predict movements, and to detect incompatibility between predicted and actual movement; it is also capable of adjusting movement so that its movement and control can become more efficient. As discussed in the literature review, research has shown that children with DCD have cerebellar dysfunction, and this affects their activities of daily living because they cannot perform motor tasks or coordinate as well as their TD peers (Summers et al., 2008).

2.2. Treatments for DCD

2.2.1. Introduction

Given the prevalence of the condition, and the potential long-term sequelae, effective treatment for this condition is imperative. Many different theories exist seeking to explain the underlying mechanisms of DCD, and this informs several different approaches to treatment (Blank, 2012).

As DCD curtails a child's ability to participate fully in normal everyday activities the World Health Organization's ICF (International Classification of Functioning) permits a unique framework of classification whereby all the major treatments which are available for DCD can be placed into two categories; (1) Bottom-up, and (2) Top-down.

Bottom-up approaches are deficit-oriented approaches. They are grounded in hierarchical theories of motor control (Barnhart et al., 2003) which use a relatively small set of principles involving the spinal cord, the brain stem and the cortical motor area to give meaning to a much more complex system such as motor control. The bottom-up approaches focus on remediating motor function difficulties by addressing the underlying deficits in sensory and perceptual neuronal functioning. Examples of bottom up treatments are Sensory Integration Therapy, process-orientated treatment and Perceptual Motor Training (Mandich et al., 2001a), which are explained in more detail below.

Top-down approaches are process-oriented approaches. They place an emphasis upon the cognitive aspect or problem-solving skills approaches involving the manner of selecting and implementing the most appropriate strategies for successful task performance (Sugden and Chambers, 1998, Mandich et al., 2001a, Miller et al., 2001, Barnhart et al., 2003). Top-down approaches will accentuate the contextual domain in which motor behaviour takes place. Examples of top-down theories are task-specific interventions and cognitive approaches (cognitive orientation to daily occupational performance - CO-OP). These are explained in more detail below, and then in the subsequent section the comparative efficacy of these two treatment types is discussed.

2.2.2. "Bottom Up" or Deficit-Orientated Approaches

2.2.2.1. Sensory Integration Therapy (SIT)

Sensory Integration Therapy is a type of intervention which is based on the purported link between a dysfunction in sensory integration and DCD. For a child who has difficulty with coordinating a sequence of movements, as required for tying shoelaces or riding a bike for example, then SIT addresses the underlying processes required for these tasks by using activities such as swimming, negotiating mazes and obstacle courses, and using building blocks and constructional toys, to promote motor development. Bundy’s theory of SI states that an individual develops an ability to adapt as they take part in an activity which is meaningful, and that this subsequently improves ability to process sensation and will also improve learning and behaviour (Bundy et al., 2002). As stated previously, DCD involves a communication dysfunction and joint functioning breakdown between the left and right hemispheres of the brain (Dyspraxia Foundation, 2014). SIT's goal is to provide stimulation which targets particular brain levels which are primarily subcortical e.g. the left hemisphere which houses language regions. Similarly, stimulation of the visual and auditory brain regions enables them to mature or to function with greater normality and more as an integrated whole (Bundy et al., 2002, Miller and Fuller, 2007). SIT used to promote improvement in deficits of the vestibular system in DCD could include the use of swings, rocking chairs, performing cartwheels and dancing. All of these involve a range of head movements which stimulate the vestibular system (Angelaki and Cullen, 2008).

Ayres (Ayres, 1989) suggested that the young brain is a naturally malleable entity with its structure and function becoming firmer and more set with age. She stated that the brain's formative capacity facilitates a person-environment interaction which promotes and improves neuro-integrative efficiency. If this is deficient in any way it means that an individual's ability to interact effectively in such a transaction at critical periods, causes an interference with brain development and consequently affects overall ability. Ayres suggested that addressing dysfunctional issues therapeutically at a very young age will optimize an individual's opportunity of developing normally.

Ayres' research highlights the possibility that a child with SID often demonstrates lack of motivation or inner-drive to actively participate in activities and to attempt new experiences or new challenges. Following intervention however the inner-drive is strengthened and this promotes self-fulfilment and growth which promotes more activities to be undertaken. As this is done it will improve sensory integration functioning (Ayres, 1972a, Ayres, 1972b).

SIT is popular with both parents and Occupational therapists today because its theory is believed to address the links between sensory input, brain function and behaviour (Lane and Schaaf, 2010). Its use is widely promoted to the extent that many reviews in terms of its effectiveness have been conducted over the past 21 years in an attempt to prove its efficacy. To date, however nothing more than its ability to be as effective as other alternative treatment (European Academy of Childhood Disability, 2011) has been shown, but parents like its therapeutic application because of its ability to be tailored to meet the needs of the individual child (Miller and Fuller, 2007).

2.2.2.2. Kinaesthesia - Sensory Motor

Kinaesthesia is defined as an awareness of one’s own body position and movement via sensory organs (proprioceptors) in the muscles and joints of the body (Barnhart et al., 2003). Kinaesthesia’s therapeutic intervention is an example of a ‘bottom-up’ approach providing stimulation to the sense organs administered by means of a process-orientated intervention (Barnhart et al., 2003). Its aim, using play activities, is to alter the brain’s response to touch, sound, sight and movement. The method concentrates on addressing important components involved in motor-skills acquisition by improving the individual’s ability to perceive one's own body parts, movement and weight. Research has shown that stimulating one area using a particular intervention can effect a reaction in another region of the body, but this is not a well-researched or understood area (Treisman and Lages, 2010). Treisman’s study investigates how sensory information comes in and how it is received across modalities. He found that the kinaesthetic inputs, including those from the vestibular system, which involve compensatory movements and adjustments in body position, could be performing two functions i.e. enabling the individual to measure his body alignment and to feel the direction of gravity. To allow someone to sit, stand or to make corrective movements the body needs to align with gravity and, for this, vestibular and proprioceptive inputs will be generated. As a result, the inputs may be used in the process of stabilizing kinaesthetic criteria for the principal axis, which are defined in relation to gravity (Treisman and Lages, 2010).

Following a systematic review of literature it is known that children with motor difficulties are lacking in kinaesthetic perception, and improvements in areas of kinaesthetic difficulty will result in improvements in their overall motor performance (Blank, 2012). Any therapeutic intervention utilising a process-orientated treatment plan will be designed and grounded using training activities which are kinaesthetic. Laszlo and Bairstow suggest that this method should incorporate a built-in reward system through the use of positive reinforcement strategies but should also employ the conferral of desirable and achievable activities of the child. In addition to this the method will incorporate a sensible progression of difficulty within it (Laszlo and Bairstow, 1983).

2.2.2.3. Perceptual Motor Training (PMT)

PMT is a multifaceted method which has been a frequently used approach amongst clinicians for many years (Missiuna, 2013). It involves children during their preschool and primary grades using a combination of movement abilities with academics such as reading, writing, language and mathematics. Its acceptance has largely been based on informal, subjective evidence rather than on efficacious experimental research studies (Kavale and Mattson, 1983).

PMT provides the DCD child with a variety of motor experiences together with sufficient opportunities to rehearse the skills, e.g. in static balance, where one type of training task would involve walking on a balance beam at the same time as reciting the alphabet. PMT is believed to have similarities to other bottom-up approaches because it assumes that a causal link exists between motor behaviours and the perceptual processes underpinning them. Improvements are expected to take place in motor ability as a consequence of improvements in sensory and motor task experience (Missiuna, 2013). Even Piaget (1952), whose work was based on perceptual motor development, stated that children develop through sensory experiences such as touch, kinaesthetic, visual and auditory means, and that these subsequently result in forming the child's perception (Fraisse and Vautrey, 1952). In a neuroscience journal paper written by Censor (2013), evidence supporting causal links with memory encoding and consolidation is examined and presented. Censor suggests that general learning takes place when a task is repeated and that this supports the notion that perceptual and motor learning in human beings exhibit analogous properties but that there are similarities in the interactions between primary cortical regions and higher brain regions (Censor et al., 2012). While the examination of literature in Censor's manuscript does not specifically examine studies referring to children with DCD, his work offers potential explanations regarding the processes involved in perceptual and motor learning. It is posited that these could offer opportunities to gain further insight into understanding neurological conditions of which DCD is an example. Despite the popularity of PMT in practice, within the classroom and in clinical settings which could suggest its efficacy it is notable that in a meta-analysis of 180 studies investigating the effects of PMT the data did not find that this method of treatment was significantly effective in remediating motor difficulties in terms of hard evidence. However, the approach is often used as a contrast group in research studies and also in studies involving groups using combined treatment approaches (Missiuna, 2013).

To summarise, PMT is one example from a number of bottom-up approaches centred on theories grounded in maturing the neural processes, such as those with DCD, so that improvements can be seen in their capability to receive environmental information, and to compare that information about present movement to past memory of movement so that the individual can select appropriate further movement. In other words, PMT, like other bottom-up theories, attempts to remedy underlying deficits in motor capabilities so that overall motor performance improves. The improvements should then translate into an improvement in the quality of life for that individual. Research indicates that bottom-up approaches such as SI, process-orientated intervention, PMT or a combination of them are used very regularly in the treatment of children with DCD (Missiuna, 2013) even though their efficacy has not been shown to be significant. They are popular, however, and despite the conflicting results found in empirical research most clinical and case reports show positive findings (Davis, 2010).

2.2.3. "Top-Down" or Process-Oriented Interventions

2.2.3.1. Task-Specific Intervention

Task-Specific interventions concentrate on direct skill teaching like standing, ball skills, holding utensils, to name but a few. Its theoretical foundation, within a child's motor conduct, results from learning which is specifically task-focused. Motor tasks are broken down into steps which are independently taught. By the time each step is completed the entire task has been accomplished (Mandich et al., 2001a). It is understood that handwriting problems will not disappear without intervention (Van Galen, 1991) and that task-specific interventions are ideal to assist in improving handwriting in children with DCD who often struggle with holding pencils and pens.

2.2.3.2. Cognitive Approaches

Cognitive Approaches to motor development are based upon problem-solving methods to guide skill acquisition, which is an important part of motor development (Miller et al., 2001). One such approach utilises the Goal, Plan, Do it and Check (GPDC) framework (Barnhart et al., 2003):

- Goal: What am I going to do?
- Plan: How am I going to accomplish the skill?
- Do it: Go ahead and perform the skill.
- Check: How well did my plan work?

(Barnhart et al., 2003, p.726).

The child utilises a self-guiding verbal method to apply the framework to motor learning shown above. Within this approach the practitioner or therapist will act as a guide so that the child is enabled to deduce a method of improving his motor performance (Mandich et al., 2001b).

Both task-specific and cognitive approaches offer the opportunity for the individual to practise specific motor skill learning, but the cognitive method in particular is advantaged because it promotes problem solving which is independent, and to date there is more efficacy research to recommend task-orientated approaches (Smits-Engelsman et al., 2013).

2.2.3.3. Parent-Teacher Intervention

In the United Kingdom the Early Years Foundation Stage Framework (EYFS)(Department for Education, 2014) exists for use by nurseries, pre-schools, reception classes and child-minders who are registered to convey it in practice and for the purpose of supporting experts working within the EYFS to assist children. It was conceived by parents and experts in child care provision but revised in 2012 to make its delivery simpler and to ensure that focus is centred on the development of the child in seven areas of learning. Within the framework a staged reporting system operates between the parent and professional assigned to the child so that they can communicate about that child's individual progress. Between the ages of 3¼ and 5 years they will be monitored in their ability to control objects through pushing, patting, throwing, catching or kicking, and similarly in tasks such as planting seeds/bulbs in a pot or garden patch, so it would seem feasible that irregularities in motor coordination at this stage could be identified and reported, assuming that the professional is aware of the particular symptoms of DCD. The framework recommends activities for parents and children to undertake together, again providing valuable opportunities for the parent to identify inconsistencies in expected capability for the child's age group.

In summary, top-down approaches seem to correspond with many of today's learning theories which focus on methods such as task-specific and cognitive-based intervention methods within everyday situations and because there is more efficacious research to recommend them (Smits-Engelsman et al., 2013). Cognitive-based methods, for example, demand that the individual child has an ability to set their own goals and, for this, they must have sufficient cognitive abilities to interact in order to benefit from this approach. Additionally, as the method requires a strong communication between the practitioner and the child then the latter must have sufficient language skills to get the most out of the method by responding to the therapist's individualised treatment method. Together with this a child will need to be approachable, but of course as DCD has a high comorbid ADHD component where there is a deficiency in attention, this could create some difficulties (Fliers et al., 2011). Some research suggests that if learning a new skill is what is required to function correctly within one's environment, then more focus should be placed on interventions such as these which are based on functional activities, rather than concentrating on the underlying components of disability as is the focus of bottom-up approaches (Gentile, 2005). Not everyone agrees with this view, however. Fascia Bowen, while never researched in the scientific domain, has shown to have positive outcomes in clinical practice working with children with DCD over more than 20 years. It is therefore imperative to research its efficacy because of this.

2.2.4. Efficacy

The UK currently follows guidelines for treatment of DCD as laid out by the European Academy of Childhood Disability (EACD) (European Academy of Childhood Disability, 2011). They base their guidelines on extensive meta-analysis of literature about treatment effects using motor interventions for children with DCD. The treatments referred to are top-down approaches (namely task-specific and cognitive interventions, followed by parent/teacher instruction, group therapy and indivdual therapy). These are shown to be the recommended interventions as they are observed to be significantly more efficacious than the bottom-up interventions (Smits-Engelsman et al., 2013). Conclusions reached in the meta-analysis were achieved by using literature highlighting participants with motor performance 1 Standard Deviation (SD) below the mean. Additionally, other papers included in the analysis were those using the DSM-IV diagnostic criteria or medical diagnosis following examination using standardised motor tests confirming the motor impairment. The standardised tests utilised were the Motor Assessment Battery test for Children, the Concise Assessment Method for Children's Handwriting or the Gross Motor Development-2 test. Samples which included children with a syndrome, including ADHD or dyslexia, were included in the descriptive parts of the paper, but were then excluded from the meta-analysis in order to identify those with a purer DCD diagnosis. All eligible studies excluded those whose participants had cerebral palsy, stroke, traumatic brain injury, leukodystrophia or muscular disorder, so that only more pure DCD studies were included.

Of the original 3708 studies identified by the meta-analysis (Smits-Engelsman et al., 2013), only 26, published between 1995 and 2011, met the review criteria agreed by a working group for the EACD in 2008. Intervention timescales reported were diverse in format as they ranged between periods of 2 weeks to 6 months with instruction times provided ranging between 4 to 26 hours. Seventeen studies had an average sample size of 44 participants and one had over 100 participants. All were reviewed by between 2 and 4 independent experts and after consensus was agreed the papers were, again, re-evaluated. If 2 experts disagreed then a third was consulted, and authors did not rank their own papers.

According to the same meta-analysis, top-down interventions were identified as being the most frequently investigated therapeutic approach. These were reported to be more successful in comparison with the bottom up-approaches (Martini and Polatajko, 1998, Miller et al., 2001). Their success could be partly because they use spatial and sequence learning strategies such as marching in time to rhythm, counting from 1-20, asking a child to identify (with eyes shut) different noises followed by asking them to construct a sentence about what they heard or teaching them to stand at arm's length from the person they are talking to (in view of their inability to keep a social distance without 'invading someone's space'). The spatial and sequencing strategies showing strong treatment effects work in combination with the demands of task attention and working memory whilst the child is simultaneously engaging in problem-solving activities. These are known to improve mathematical capabilities. Another reason for their greater success is assumed to be because top-down approaches assume that motor requirements for tasks are variable and that the motor control needed for any specific task improves substantially when the child knows what is expected of him and that he can identify, develop and use cognitive strategies to manage the task more effectively.

Task-specific top-down interventions i.e. Neuromotor Task Training (NTT) and Cognitive Orientation to daily Occupational Performance (CO-OP) are reported, in studies with robust methodology, as being more beneficial for children with DCD because they demonstrate stronger effect sizes, despite not being significantly better statistically than the other approaches (Smits-Engelsman et al., 2013). The limitations highlighted by the authors of this study indicate that many studies reviewed did not control for important variables such as age and co-morbidity which could have influenced the results. Additionally, these factors were not taken into account when the results were interpreted nor did they explain the methods utilised in the studies specifically enough to permit replication (Smits-Engelsman et al., 2013). As far as any research is concerned, unaccounted variables such as these are significantly important as they introduce weaknesses into any evidence-based enquiry. Consequently there will be an overall limitation as to what extent the findings can be used to guide on future practice. The current research, which is the topic of this thesis, recommends utilising a bottom-up, process-orientated intervention to improve neuromuscular improvement. However, while the EACD guidelines suggest that future research could potentially find bottom-up, process-orientated interventions to be effective, limited efficacy research exists at present to recommend them. Currently, therefore, the indication is that only top-down, task-orientated interventions improve motor function in children with DCD. The positives to take from the

EACD guidelines are that the current research will account for variables such as age and co-morbidity, and ultimately the aim of the guidelines is to demonstrate that a process-orientated intervention will improve motor function in children with DCD. Additionally the note expressed by Smits-Engelsman (2013) is that bottom-up interventions have shown positive effects when used.

A meta-analysis conducted by the Centre for Reviews and Dissemination, Univeristy of York, examined the efficacy of one bottom-up therapy, namely Sensory Integration Therapy (SIT), using studies conducted between 1972-1994. This study is 20 years old but it demonstrates the longevity of efficacy research into this therapy. The findings were based upon reviews of articles comparing SI with no treatment and SI with an alternative treatment. The studies included in the review utilised sample sizes between 191 and 341, included controls, and consideration was taken for variables such as age, diagnosis, design quality, sampling methods, outcome measure numbers and the affiliations of the researchers involved. This was done to avoid as many confounding variables as possible. Conclusions reached showed that participants who received SIT showed no more improvement than those receiving alternative treatments or no treatments at all (Vargas and Camilli, 1999). These conclusions were reinforced in a 2012 systematic review of meta-analyses which reviewed the effectiveness of SIT for children with sensory processing disorders (Zimmer and Desch, 2012). In this more recent paper, despite identifying some earlier positive outcomes from case series and observational studies, the overall recommendation was that due to insufficient scientific rigour and the utilisation of too many different outcome measures, any ability to draw firm conclusions and to identify treatment effects was limited. Medical practitioners are not advised to recommend treatments unless they have a strong evidence-base. If parents wish to utilise sensory-based therapies for their children, despite the lack of proof of their efficacy in treating children with developmental and behavioural issues, then the paper recommends that paediatricians should assist families with the monitoring of treatment effects on the child's behaviour at treatment onset, and advise them on defining treatment goals pre-treatment and setting a timescale for follow-up discussions about whether the therapy is proving effective in terms of the pre-defined treatment goals.

Pollock posits that reviews conducted on SIT outside the occupational therapy domain have always been particularly critical (Pollock, 2009). She confirmed the criticisms highlighted above, particularly where they highlight design weaknesses, in particular inclusion criteria for samples, lack of a specific treatment protocol (with SI interventions amended by particular practitioners thus involving a lack of adherence to the original Ayres' classical SI method) and gaps in provision of appropraite outcome measures which would detect differences. Supporters of SIT agree that studies conducted to date lack validity due to flaws in the methodologies utilised (Miller et al., 2007, Parham et al., 2007). Lessons learned and reported by these authors, having identified past criticisms, suggest that there is a need to locate homogenous samples using quantifiable inclusion criterias. Additionally, there is a requirement to develop an instruction manual to permit a study to be replicated and to develop a fidelity to treatment measure in order to identify particular outcomes most sensitive to changes. In particular, it is important to identify which changes relate to what parents consider most important (later identified in a study to be self-regulation, interacting with peers, participating in skilled motor activities, and self-confidence (Cohn et al., 2014)), and to identify rigorous methods of testing such as the blinding of examiners, randomization and power calculations. They also advocate that an extensive programme of research is required, including the necessity to conduct many pilot studies because past successful OT studies on SI have usually been single projects rather than programmes of research with long-term strategies. One recent study has reported the successful development of a fidelity measure for utilisation in SIT research based upon the effectiveness of the Ayres' Sensory Intergration intervention method. In particular this measures the structural and process aspects of Ayres' intervention. Results show that the measure has strong content validity and that its process component is sound and reliable when scored by raters trained in the scoring of therapist strategies and who are expert in the Ayres Sensory Integration intervention (Parham et al., 2011). This could signal a new chapter in testing the effectiveness of SIT.

The EACD's most recent (2011) recommendations about the effectiveness of bottom-up approaches show that research findings indicate that they are not as effective as top-down approaches (European Academy of Childhood Disability, 2011). However, studies attempting to demonstrate the efficacy of SIT should now begin to appear as they incorporate more rigorous methods of testing developed as a consequence of past criticisms. Utilisation of a treatment protocol remaining true to Ayres' original method and focusing on the priorities of parents in terms of outcomes desired (Cohn et al., 2014) should improve the quality of studies in the future.

Evidence available for other bottom-up approaches was weaker in terms of quantity/and/or quality and therefore more problematic to interpret (Smits-Engelsman et al., 2013) than SIT interventions. Additionally, the Sits-Engelsman study highlights that clear delineations about what really occurs within individual approaches have proved to be lacking because there is a genuine lack of transparency in treatment protocols. Without clarity in this area it is difficult to differentiate what aspects of approaches are effective or ineffective (Hillier, 2007).

Kinaesthetic Therapy (KT) was suggested to be inconclusive evidence and is not recommended in the guidelines (Smits-Engelsman et al., 2013). In children with poor handwriting, task-orientated, self-instruction methods to generate improvements in legibility are recommended.

Le Bon Départ and any guided parent or teacher intervention programmes were investigated once and demonstrated positive outcomes, although as they were RCT's they could only offer indicative findings; the same is true of the task-specific studies, with one study demonstrating positive effects and two which were equivocal.

In summary, as task-orientated approaches have been researched far more widely than process-orientated approaches there is more efficacy literature available and some literature shows strong treatment effects; this is not the case for bottom-up process-orientated approaches which generally utilise sound methodological bases controlling for extraneous variables. The strong effects of the task-orientated approach are demonstrated, for example, by a child working with task attention and memory while actively problem-solving at the same time. As a result the task-orientated approach is expected to be much more successful due to the child's engagement in the tasks which continually develop improved cognitive strategies thus permitting them to complete tasks more effectively.

2.2.4.1. UK Guidelines

Knowledge regarding the principles which ought to be guiding best practices and the delivery of services for children with DCD is currently very limited, according to a scoping review whose aim was to map the depth and breadth of a concept within a certain research field (Camden et al., 2014). The paper investigated best practice and how to provide a 'mapped' service delivery for the population of children with DCD. The results show that two very important themes are highlighted:

1) There is a need to organize services to meet the comprehensive needs of children; this involves heightening awareness of DCD and co-ordination as well as the need to implement clearly designated pathways which utilise a calibrated or phased approach.
2) Service providers should be working collaboratively while also offering services which are evidence based (integrating the views of both the family and the child, using interventions which are evidence based and at the same time promoting functioning participation as well as a preventative approach).

In comparison with other developmental disorders, DCD still remains poorly understood by the majority of health care providers and professionals involved in education. This is according to Movement Matters UK, which is the UK umbrella organisation representing the major groups concerned with children and adults with DCD (movement matters, 2012). They provide guidelines, called the UK DCD consensus, for the medical and educational establishments in the UK.

Despite DCD’s inclusion in the ICD-10 and the DSMV-IV-TR and DSM-V, which offer the formal diagnostic and classification systems, there is a severe lack of practical guidelines in terms of management for DCD. NICE recommendations on DCD refer to the set of guidelines utilised by German speaking countries and these are provided by the European Academy of Childhood Disability (EACD) (European Academy of Childhood Disability, 2011).

The guidelines are concerned with recommendations reached following a rigorous review of the available literature and a consensus from internationally acknowledged experts including those from the organisation called ‘Movement Matters’. All guidelines provided there identify ‘best practice’ protocols which have been established for the assessment, diagnosis process and intervention most favoured, all of which are being adopted by the German equivalent of NICE.

The guidelines suggest that all children with a diagnosis of DCD ought to receive an intervention. Additionally, it recommends that more than one intervention, in addition to those incorporated into the educational environment, would be beneficial. Specific areas to be taken into account during the planning stage should be the child’s own environmental factors, the seriousness of the individual’s condition including co-existing conditions e.g. ADHD, and specific individualising factors such as the child’s motivational traits or psychosocial factors especially when they come from dysfunctional families or if their parents have pre-existing psychiatric disorders and challenges. All of these are important considerations so that an individually tailored programme of intervention can be delivered for maximum benefit to the child.

2.3. Complementary and Alternative Medicine

In the passage above traditional approaches and interventions to assist children with DCD have been discussed. The following section discusses the role of CAM treatments and their role as possible interventions for DCD.

Prevalence of CAM

A systematic literature review was conducted using general population surveys about complementary and alternative medicine (CAM) use in the EU (Eardley et al., 2012b). Also investigated were the reasons for its use, what conditions the treatments were used to treat, and the quality of the data and reporting.

Literature reviewed dated from 1948 and included material published up to 2012. Using a pre-designed extraction protocol with quality assessment instrument (Eardley et al., 2012a), to assess over 5,500 papers in any EU language, only 87 were identified as being of sufficient quality to merit inclusion in the review.

Sample sizes ranged from small studies using as few as 92 participants to larger population surveys with 57,717,200 participants. Findings demonstrated that CAM use varied significantly (0.3-86%) and in view of their poor reporting quality it was difficult to pool information sufficiently for meta-analysis use, so the findings were narrative-based. It was possible to identify that those receiving CAM treatment the most were women but not possible to be specific about CAM usage rates in the UK. This was because figures were too varied – between 0.3% and 71% across 22 studies reviewed. Wide prevalence rates are due to the heterogeneity and the poor quality of the studies, and it was not possible to identify the most commonly or robustly stated prevalence in the UK.

Due to the inconsistent data reporting and lack of consistent use of terminology within CAM, together with the lengthy time-frame over which the research papers had been developed, it was difficult to gain a clear and reliable picture of outcomes, and so results were presented as narrative. The study did reveal that, based upon surveys conducted within the UK, Germany and Italy, it was deduced that CAM use by the entire population annually in the EU ranges between 10% and 70%. Despite the limited data which is only available from a few states the global atlas of traditional and complementary medicine (World Health Organization (WHO) Centre for Health and Development) (Bodeker, 2005) suggests that CAM use is particularly high in the EU. Estimates from the European Information Centre for Complementary and Alternative Medicine (EICCAM) indicate that over 100 million EU citizens access CAM each year for the treatment of chronic conditions and of the 100 million, 9million of those are UK based citizens. The study does not highlight specifically why usage is higher in the EU but one of its reviewers, George Lewith, also the author of a later article appearing in the Guardian's Healthcare Professional Network, suggests that the majority of Europeans who want to have access to CAM do so because it offers them treatments which are not provided within the conventional system of healthcare (Lewith G., 2012).

The United States, China and Australia already have clearly laid-out governmental strategies towards CAM research while, sadly, this is not the case for the EU.

It was concluded from the Eardley study (2012) that individual preferred treatment prevalence was difficult to estimate due to the poor and heterogeneous quality of the papers. For this reason it was impossible to pool the data (Eardley et al., 2012b). A Cochrane test for heterogeneity did appear in the research plan but it was eventually deemed irrelevant and unnecessary. Not only was the definition of CAM inconsistent across countries in the EU but there was a lack of standardised reporting due to definition discrepancies, such as, for example, what actually constitutes CAM. This varies significantly from country to country and therefore undermines the accuracy and universality of the data. This problem ties in well with the problems encountered with inconsistent terminology use in the definition of motor coordination, DCD and dyspraxia as discussed earlier and that over 70 search terms were utilised in a search to locate relevant papers.

The most commonly reported therapies used are Herbal medicine at 5.9–48.3% uptake, Chiropractic 0.4–28.8 %, Acupuncture 0.44–23%, Reflexology 0.4–21%, and Homoeopathy 2–27% (Eardley et al., 2012b). It is apparent that there is a significant lack of data to identify manual therapy efficacy, which is the reason for its focus within this thesis.

CAM use, especially in the specialisations of acupuncture, homeopathy and herbal medicine, has increased within the western industrialised nations over a period of 25 years (Eisenberg et al., 1998, Molassiotis et al., 2005, Tindle et al., 2005, Molassiotis et al., 2006). It is mostly utilised as an additional method to the care provided under the conventional medical system and specifically within acute ill-health occurrences, but also as a means of health maintenance (Eardley et al., 2012b). The UK, Germany and Italy's total population use of CAM ranges between 10% and 70%. These figures may seem wide and unhelpful but they do give an indication of the difficulty which is faced in obtaining good quality evidence of CAM use.

In another systematic review, intended to estimate the prevalence of CAM use in the UK, 89 surveys published between 2000 and 2011 with a total participant number of 97,222 were utilised. While many of these surveys were reported as being poor methodologically, the data revealed that one year CAM use prevalence by the entire population amounted to 41.1% while average lifetime prevalence within this same surveyed population revealed a figure of 51.8% of people using CAM. When surveys reported to be methodologically sound were extracted the correspondent rates were 26.3% and 44% respectively. Herbal medicine was shown to be the most accessed but Homeopathy, reflexology, massage and aromatherapy followed closely in popularity (Posadzki et al., 2013). The study recommended that as so many patients and consumers in the UK utilise CAM, healthcare professionals should responsibly advise their patients regarding its use.

2.3.1. Why Do People Seek CAM?

2.3.1.1. Introduction

If CAM is to be incorporated into the conventional system of medical provision in the future, it is important to understand the reasons given for its use of today. People sometimes seek CAM over mainstream medicine for many reasons, broadly it is categorised as dissatisfaction with mainstream medicine, viewing CAM as more holistic, viewing it as a safer and less invasive option, and also due to its recommendation by others.

2.3.1.2. Dissatisfaction with Conventional Medicine

One thousand representative German adults, with a mean age of 48 years, participated in a study whose main focus was to gather statistical information relating to health status, CAM usage, motivational reasons for its use, and which health conditions caused those surveyed to use CAM (Bucker et al., 2008). Data was collected using a computer-assisted telephone-interviewing system. This revealed that the main reasons for using CAM were based on a general sense of dissatisfaction with the disappointing results experienced using conventional medicine but also due to its perceived invasive nature and negative after-effects. As a result, the participants in the study expressed a reduced future motivation to use conventional drugs.

A study (Bernstein and Shuval, 1997) in Israel, where the country's Ministry of Health does not recognize any form of alternative medicine, investigated the attitudes of 2030 Jewish adults aged 45-75 towards CAM and their reasons for using it. Information was gathered from patients by means of structured face-to face interviews while open-ended interviews were conducted with a sample of 20 physicians from the primary care setting. Disappointment with conventional medicine success rate was cited as the main reason for accessing CAM with most participants reporting that the alternative treatment had been more beneficial. Forty percent confirmed that they used CAM as well as consulting their physician, and physicians reported that they referred patients for CAM, not because they were endorsing something which they may consider as having a lack of scientific base, but because the patients felt that it helped. Educational or economic status did not influence the attitude of patients accessing CAM, but more women than males were shown to access treatments.

A BBC study was conducted into UK CAM use due to a lack of available data about the topic in comparison with the US and Australia (Ernst and White, 2000). Using a nationally representative random telephone survey, over 1200 British adults were interviewed and the results showed that 20% of the participants had sourced CAM therapies during the previous 12 months. The treatments most popularly sourced were herbalism, homeopathy, aromatherapy, acupuncture/acupressure, massage and reflexology. The reason given for sourcing CAM was a positive inclination towards its effectiveness. On average the CAM users spent £13.62 per month, which relates to £1.6 million per year across the whole population (Ernst and White, 2000).

Alongside people's reported dissatisfaction with conventional medicine there is a growing trend for seeking treatments which are holistic (Barrett et al., 2003). Holistic treatment is often the favoured term utilised by CAM practitioners because it is traditionally considered to form the basis of their treatment protocol (Patient.co.uk, 2014). This method of treatment can involve the integration of different treatment approaches e.g.

not only CAM but it can also incorporate conventional medicine within one patient's treatment plan. Exercise programmes, homeopathic treatment, soft tissue remedial therapy, acupuncture and nutrition could all fit together with conventional medicine in an attempt to treat the patient in a more holistic way.

Two studies were conducted, using interviews based upon qualitative research methods, by Wisconsin-Madison University to assess whether CAM should be included in the health system in view of its potential capability to improve human healing. One study interviewed 20 CAM practitioners and 17 CAM users while the second study conducted 32 interviews with CAM practitioners. Both studies utilised in-depth, in-person interviews incorporating both closed and open-ended questions. The participants were recruited randomly through telephone listings. From the data collected CAM was considered to be more holistic when compared to conventional medical treatment because it generated a feeling of empowerment, access and legitimacy to its users (Barrett et al., 2003). Users and practitioners alike stated that CAM is more accessible in psychological terms due to the fact that it reflects values which are commonly held. However, in view of the small sample presented the results may be biased, and caution is needed when interpreting the conclusions drawn.

It also revealed that there are still considerable boundaries between the two traditions of CAM and conventional medicine, namely economic (with CAM almost always funded privately by the user), organisational and scientific. Additionally it was acknowledged that, generally, there is a recognised lack of understanding about CAM on the part of health professionals. These issues thwart continued attempts at integration. Much more scientifically-based research needs to be conducted; the scientific community generally suggests that conventional medicine can learn much from CAM – if the conventional system incorporated a more holistic, empowering and accessible method of therapeutic approach by adding to its existing legitimacy, with the result that it could potentially enhance its power to heal (Barrett et al., 2003). Importantly, CAM covers a wide area incorporating diverse treatment methods, some of which may not stand up to rigorous testing methods. It is therefore important that the CAM community lends its support by identifying those treatments which would be most eligible for robust scientific investigation. This would make better use of the research funds available.

Regardless of the scientific evidence base, or lack of it in the case of so many CAM treatments, it is used by more than 100 million EU citizens, with 9 million of those being UK based. However, it continues to be a highly debated and controversial subject (Lewith G., 2012).

A further reason that people seek CAM is because they believe that it is safer and less invasive (Cumming et al., 2007). Three questionnaires were placed on a UK, independent, clinician-led, patient-tailored website about menopause issues. The aim of the questionnaires was to investigate the attitude of women towards Hormone Replacement Therapy (HRT), sexual health issues and the use of alternative therapies as more desirable than using HRT (Cumming et al., 2007). All responses were anonymous. Attitudes of women were sought on various aspects of use, information provided to them and choice. The data highlighted from the HRT questionnaires showed that 75% of respondents stated that they were in favour of HRT although 73% also felt that they weren’t offered information relating to HRT use and neither did they know enough about the risks involved in order to permit them to make informed choices. 36% of the respondents stated that they felt that media reports concerning risks associated with HRT were exaggerated. The questionnaires regarding alternative therapies revealed that 83% of respondents reported that they did not have enough information to make informed decision about their use with 71% confirming that they had received no advice before commencing any alternative therapies. However, 95% did feel that they would prefer to try alternative therapy before commencing any HRT and 68% reported that they would prefer to pay £10 per month for alternative treatment rather than take HRT, as it would be more natural and less invasive than the conventional treatment option. This study highlights the need for health professionals to have more information about CAM available in order to permit them to provide users with enough information to make informed decisions (Cumming et al., 2007).

Many people want the freedom of choice regarding their own healthcare provision, and the CAMbrella initiative consider CAM to be the best method to achieve this (Cambrella, 2012). CAMbrella is an EU-funded project investigating CAM provision in Europe, suggests that as demand is increasing then, as in the United States, Australia and China, who have a government-funded approach to CAM, the EU replicate this by presenting a clear financial and strategic approach to CAM provision, which currently has no active encouragement from either government of academia. Once this is in place an EU research office could be established in order to research CAM provision for long term chronic conditions and self-care approaches to long term conditions.

2.3.2. CAM Therapies in the NHS/NICE

In view of the frequent use of CAM within the UK and internationally it is important for the policy makers to take into account that this has enormous and far-reaching implications for the health-care system and health policy both now and in the future (Bucker et al., 2008).

The value of CAM provision is often viewed with scepticism within the NHS, and this is understandable because so much of CAM has lacked the scientific evidence base necessary to recommend it to patients. To safeguard the patient, recommendations have to be accompanied by a sound body of evidence indicating that a given treatment must not cause harm to the patient. There have been incidences when even the most robust of scientific evidence, permitting the use of a particular treatment, has subsequently shown to have been severely detrimental to the health of individuals. An example of this was the drug Thalidomide which was often prescribed to relieve morning sickness in pregnant women and which subsequently caused many abnormalities in their unborn children (Evans et al., 2011). Its detrimental effects were not discovered until it had been in wide public use over a period of many years.

The popularity of CAM use suggests that it is vitally important that policy makers consider the viewpoints and preferences of the patients, especially as the NHS attributes such importance to patient choice (Department of Health, 2013). However, the NHS cannot offer non-evidence-based medicine. In light of the documented increase in CAM use by patients suffering particular medical conditions, as previously highlighted, there appears to be sufficient grounds to establish a system whereby funded research is instigated and conducted in order to robustly investigate any health improvements gained by patients along with the cost benefits. There is a broad spectrum of CAM treatments and some may show no improvements other than those of placebo effect. However there must remain an expectation across all domains, whether using conventional or complementary and alternative medicine, that efficacy of treatments, using appropriate and robust scientific research methods, should be an equally important requirement. Until this is achieved, choice for patients will remain limited – and of course it goes without saying that research alone is not sufficient; it will need to demonstrate efficacy of the CAM treatments before they can be utilised as a patient option.

The more efficacy research into CAM becomes available, then the more hope there is that greater choice of treatments can be incorporated into the NHS than are currently available (NHS Careers, 2014).

2.4. Research in CAM

2.4.1. Importance of Rigorous Testing and Strong Evidence Base

In the overwhelming interests of the patient and professionals alike there is a need for evidence-based medicine because the research on treatments is rigorous thus providing sound evidence on which to base treatment recommendations. Patients have the right to expect that this happens so that confidence in their healthcare provision is generated (Evans et al., 2011). Theory or professional opinion is not always a reliable guide to what treatments are safe and even if the treatment is long established there is no proof of its capability to do more good than harm, as witnessed by the Thalidomide drug which was widely prescribed to pregnant women from the 1950's but ultimately withdrawn in 1961 having caused widespread malformation in babies (Evans et al., 2011). Importantly, testing and regulation of medication has changed significantly since the 60's. Even without the patient suffering in view of inadequately tested treatments then it can be wasteful drain on private and /or public resources.

2.4.2. Controversy Surrounding Poor Evidence in CAM

Ernst (Ernst, 2006) states that because CAM is appealing to more patients, choice should be an extremely important factor in healthcare provision. Consequently, it needs to have an efficient, relevant, accurate and accessible evidence base which would help people to participate more in their healthcare decisions and allow them to focus on outcomes which are important to their lives. Producing a guide would be beneficial but would need to involve a range of skills in its production, including the involvement of scientists who understand scientific research.

A systematic review was carried out by Meyer et al (Meyer et al., 2013) to synthesize/overview all of the Cochrane reviews published between 1995 and 2012 to establish CAM efficacy in paediatrics. This addressed clinical implications and limitations of CAM use in children. Conclusions showed a disproportionate amount of inconclusive reviews and highlighted that there is a need for high quality research conforming to the same science-based standards as conventional therapies.

It is not surprising that CAM practice has been criticised, because its practitioners are generally not scientists, or anatomists. The criticisms against it, of which there are many, mainly focus on the lack of rigorous scientific research base to prove treatment efficacy . Failure to demonstrate the mechanisms by which the treatments are expected to work also weakens CAM's case. It would be beneficial if healthcare providers in the UK were prepared to facilitate the research to address the subject of this criticism. Additionally, during the process of this thesis' research for example, the fascia Bowen practitioners who initially indicated their enthusiasm to be involved subsequently withdrew their support when they realized that they would need to assist with the recruitment process. This suggests that while some CAM practitioners declare an interest in enhancing or furthering CAM research, in reality the mind-set does not lend itself to rigorous scientific processes.

This last point is further supported by evidence which indicates that there is no support for CAM even if CAM practitioners study to gain research experience which permits them to undertake scientific studies, the lack of funds for research also preclude progress (Scriven, 1998, Saks, 2001, Welsh et al., 2004).

The 6th report from the Select Committee on Science and Development states that they have received much evidence indicating the powerful status of the RCT method of researching particular medical therapies, but many scientists, while seeing it as the best research tool, state that this method could potentially fail to fully embrace the CAM paradigm (Select Committee on Science and Technology, 2000). Some CAM practitioners suggest that RCTs cannot do justice to the specific, holistic and person-centred approach adopted by many CAM therapies (Select Committee on Science and Technology, 2000). Some of the argument behind these views is that RCTs often require the standardisation of treatment in order to produce a valid comparison. However, standardised treatments cannot always be easily equated with individualised treatment. The reason for this is because the latter has a higher value and the standardising of treatments can potentially produce outcomes in the research which are not truly representative of the therapy under scrutiny. However, whilst the argument reported above has strengths, it also highlights weaknesses because, depending upon the CAM treatment, a standardized format could be offered alongside a control treatment. This strategy was included in the original design of this thesis' research until insufficient participants could be recruited to form an intervention as well as a control group. However, according to the Medical Research Council (MRC) framework (MRC, 2000), the appropriate pre-requisite to conducting a RCT should be in the form of an exploratory trial. This would investigate the theoretically expected treatment effects, to identify appropriate study design and analyses and to inform decisions for the main trial planned for the next phase of the research process.

Stewart-Brown (2011) suggests possible reasons why CAM research shouldn't be governed by the need for the gold standard RCT. She suggests that practical and theoretical issues must challenge this need for RCT methodology in the children's preventative services for example (Stewart-Brown et al., 2011). RCTs are excellent methods for research with pills as they will appear to be indistinguishable from the placebo offered in the control arm and neither a clinician nor the participant would be able to identify the one with the active ingredient. Within a manual therapy's data collection period Stewart-Brown suggests that the participants will immediately know which of the interventions they are receiving, whether the sham or the real intervention under investigation, and that the participants will then pre-judge which will be better. This is not always the case and if the study is well-planned and well-executed then the participant would not be able to differentiate between the actual treatment and the sham.

Another problem with placebo or sham treatments is that participants, or the parents in the case when children are the participants, will be less likely to see the research through to the end or even consent to take part in a research process at all if they know they are likely to receive less benefit if allocated to the placebo treatment. People who are ready for change are unlikely to consent to participate in something if they know that they may be randomised into the group not receiving the potentially helpful intervention. Recruitment of only those who are ready for change signifies the introduction of recruitment bias which will affect the external validity because the results eventually obtained cannot be said to be truly representative of a population group. The alternatives to RCTs could be those which randomise the participants before recruitment as with the

Zelen's design (Adamson et al., 2006). This would overcome the issue of excluding those prepared to change from the intervention group and could be a preferable solution (Stewart-Brown et al., 2011).

2.4.3. Future of CAM Research

The intervention, which is the topic of this thesis, is a CAM treatment which is currently not an approved therapy under NICE guidelines. The reason for this is that it does not have sufficient efficacy research to recommend it. As discussed, lack of rigorous research in this situation needs to change. However, an interesting and hopeful development is currently taking place in the form of the CAMbrella coordination action (Cambrella, 2012). This may bridge the chasm in which sits the historical lack of evidence in CAM, referred to above, and the possible lack of communication which exists between conventional medicine and CAM. CAMbrella is an important pan-European research network for CAM which provides a plan for proposed research to 2020, specifically in the areas of clinical and epidemiological research for CAM use by European citizens. Vitally, the information is provided for public sector, private and institutional healthcare organisations. CAMbrella's source of funding is the European Union's Seventh Framework Programme (FP7), which is a research and technical development programme, with the European Research Council (ERC) forming an important part. The evidence base provided by this research, through systematic literature reviews, allows people to make informed decisions about CAM, whether negative or positive (Fischer et al., 2014), in the hope that it will not only pave the way for an increased schedule of research into CAM and more rigour in the methods of research utilised, but that it will also identify any healthcare changes likely to take place within European healthcare in future years. The outcome of the research to date indicates that there needs to be a comprehensive knowledge-base regarding CAM's prevalence in

Europe which will be facilitated by communication across governments, public charities, charitable bodies and industry funders. This will then permit the CAMbrella office to identify and coordinate developments within the research, both at home and internationally, identify further funding opportunities and to source, document and disseminate information for further research into issues such as the safety of CAM, comprehensive citizen health needs and collaboration between the EU countries on CAM. As a result, the centre will provide a base from which to inform healthcare and decision-making, and will also satisfy the demand for a rigorous approach to CAM research and an integrated method of health care decision-making across the EU countries. Above all it will place the service users, who are the driving force of CAM-use to have an important place in the decision-making process so that more choice is integrated into their healthcare system (Cambrella, 2012).

2.5. What is Fascia Bowen Therapy?

It is clear that the public would like access to CAM treatments; however, in order for it to be made readily available on the NHS, efficacy research needs to be conducted. This investigation hopes to begin to address this paucity by utilising a CAM intervention called Fascia Bowen therapy. It is a soft tissue remedial therapeutic treatment used in private clinics for over 20 years and has traditionally been utilised to treat children.

2.5.1. Bowen and Fascia Bowen

Fascia Bowen is an even gentler version of the Bowen therapy from which it is derived. Bowen therapy was the invention of Mr. Tom Bowen (1916-1982) from Geelong, Australia (Bowen Therapy Professional Association, 2012b). Its aim is to cause the body, through stimulation, to re-align the structure of soft tissue including fascia, muscle and neural tissue, at different levels although this is currently only a theoretical mechanism by which Bowen and Fascia Bowen are proposed to work. As a result, practitioners would expect to see a reduction in anxiousness in the children they treat, less mis-alignment of muscle presentations in their body, and a general increase in energy as a result of improvements in alignment. The Bowen procedures involve non-invasive, hands-on moves performed with fingers and thumbs. Specifically this means taking the skin slack using a posterior move followed by application of a rolling movement over muscles and ligaments in specified locations according to the teaching manual. The manual of procedures is not available in the public domain. Bowen and Fascia Bowen can be administered through clothing or directly onto the skin and the practitioner follows guidelines which have been laid down in the teaching manual and demonstrated to students during the Bowen practitioner training programmes. Moves have a procedural order as noted in the treatment manual and some moves cannot be administered more than once. Fascia Bowen practitioners must, in the first instance, hold a human Bowen therapy qualification which requires up to one year for the completion of detailed and comprehensive case study reporting requirements. Thereafter qualified practitioners can attend Fascia Bowen courses.

Information regarding the therapy is limited in the public domain in order to avoid ‘do it yourself’ uses of it by those who haven’t attended the professional courses. The training courses teach essential strict protocols in terms of treatment procedures, patient and practitioner safeguarding issues, risks and benefits to patients regarding the procedures themselves, and instruction about when some procedures should be adapted or not used at all in certain circumstances e.g. no coccyx moves should be performed on pregnant women as this could potentially induce labour. Additionally, the practitioner must avoid adopting the usual leg elevation angles in the treatment of patients following hip or knee replacements. Patients wishing to learn about Bowen therapy and Fascia Bowen therapy, for both children and adults, are directed to the Professional Association website where they can learn enough about the therapy to permit them to make an informed decision about whether to attend, or to take their child to a therapy session (Bowen Therapy Professional Association, 2013).

Fascia Bowen was developed from the Bowen work by Mr. Howard Plummer in Cardiff, Wales, United Kingdom with the first children's clinic established by him almost 30 years ago (Bowen Therapy Professional Association, 2012a). No drugs are administered as part of this therapeutic intervention. Anecdotal evidence suggests that improvements experienced by the patients and observed by families, friends and educators, indicates that the therapy, while realigning soft tissue, could also be restoring homeostasis and physiological equilibrium to the body (Bowen Therapy Professional Association, 2013) . Anecdotal evidence (Wilks, 2013) suggests that it may address functional imbalances in chemical composition, but further research is necessary to test these theories and to establish which chemicals are involved. Testosterone and cortisol are mentioned in Wilks' paper (2013) but more research needs to be conducted to prove their involvement and to test the efficacy of the treatment in the scientific domain. The therapy is suitable for adults, children and babies but Fascia Bowen is particularly suited to children who may be hypersensitive to touch as it is applied even more gently than traditional Bowen work.

2.5.2. Rationale (How it Works)

2.5.2.1. What is Fascia?

For the purpose of this thesis the following definition will be applied:

Fascia is a thick and continuous, collagen-like, communication network surrounding every muscle, from the minutest myofibrils which are slender threads forming a muscle fibre, to each individual organ of the body (Schleip, 2003). Scientists often refer to it as the organ of form because of its characteristic stable but irregular three-dimensional, tensional format (Garfin et al., 1981, Varela and Frenk, 1987). It is a body-wide connective organ, important in balance, posture, and in all aspects of body movement. Fascia Bowen practitioners consider fascia to be a vital component which needs addressing, especially in the treatment of individuals compromised in neuromuscular function. As indicated in the title of this thesis, it is proposed that stimulation of the fascia could potentially effect changes in compromised areas of motor difficulties, and specifically where it is found in those with DCD.

Dr. Robert Schleip, the Fascia Research Project Director at Ulm University, refers to fascia as one of the richest sensory organs because it contains nerves and blood vessels. As a consequence it is an important part of body perception. This is an area of function which is compromised in those with DCD (Schoemaker et al., 2001). Fascia Bowen practitioners are taught to address the fascia of individuals with DCD who have dysfunctional perception problems.

As a working organ, fascia is made up of numerous compressile parts some of which touch each other while others do not. However, even those touching will slide without hindering each other (Guimberteau, 2012). Due to past debates about fascia function, terminological differences and the inconsistencies utilised by different specialisations e.g. medical anatomists and fascia scientists. Fascia has local differences which, for identification purposes, can be described using local terminology. However, it is not local in terms of its function although it is often quoted to be so in the medical textbooks, including some of the past editions of Gray's Anatomy (The British Fascia Symposium, 2014). Fascia is a three-dimensional floating structure which is under tension and composed of two different types of building components (Schleip, 2014, Chaitow, 2014b). For the layman, it is similar in concept to a tensegrity toy which distorts when compressed but when the pressure is released bounces back to its original shape. Fascia density varies with the demands required of it locally e.g. as with the iliotibial band which is not present in humans until they begin to use their legs in load-bearing activities such as crawling, standing or squatting. As the area is used, the iliotibial band develops and thickens (The British Fascia Symposium, 2014). Different regions of fascia, depending upon its thickness, will require different stimulus strengths to affect it (The British Fascia Symposium, 2014). Fluid passes easily through fascia, which permits it to function hydraulically as a result of stimulation both from internal and external sources. Our knowledge about this has advanced due to the research work conducted by surgeon Dr.Jean-Claude Guimberteau, MD, on flexor tendon movement (Guimberteau, 2012). Amongst fascia's capabilities are its ability to form scar tissue, or adhesions, and complex contractures known as the condition of shortening and hardening of the muscles, tendons or other tissue. This can result in joint rigidity which can often be found in children with DCD. Rigidity can lead to chronic dysfunction and pain, and these are addressed in practice by Fascia Bowen practitioners. Even when removed from the body in cadaver studies, fascia has been shown to have the ability to contract and to relax independently and this is why fascia research scientists such as Dr Robert Schleip have been able to posit that tension and pain can both begin in the fascia. Fascia's role begins just below the skin's surface, so its communicative network can be easily manipulated from outside the body, stimulating it to slide hydraulically in an attempt to relax it (Schleip et al., 2012). This ability to reduce tension by external stimulation using manual touch is an important feature in a Fascia Bowen intervention because, anecdotally, practitioners report that they notice unilateral tightness in children with DCD, when compared with their TD peers. This imbalance tends to disappear after approximately two treatments, but of course it is dependent upon the individual's sensitivity and response rate to the treatment. Further details on the methodology and development of Fascia Techniques can be found in Appendix 1.

2.5.2.2. The Role of Fascia in Proprioception

Proprioception is a term used to describe the ability to sense sensory stimuli contributing to the sense of self in terms of position and movement. This happens at both the conscious and subconscious levels and involves a multi-component sensory system. Defective conscious proprioception results in the inability to facilitate complex motor activities and, in turn, this results in stumbling. A defect in unconscious proprioception, which is vital for the coordination of posture, results in problems with sitting, standing and in simple activities involving arm movements (Johnson et al., 2008). Amongst its many manifestations in DCD, faulty proprioception manifests as one of the chief guiding symptoms for DCD, namely clumsiness, and those with the condition often have problems in both their conscious and subconscious i.e. the nervous system proprioception (Skoglund, 1973). It is important to remember that the sense of self, referred to above does not refer to the psychological understanding of body image sense or body awareness. Furthermore, proprioception must not be confused with exteroception, which relates us to the outer world, or interoception which is the process involved in informing an individual about visceral and metabolic processes (Van der Wal, 2009).

The sense of proprioception is defective in numerous neurological disorders as well as in DCD. Proprioceptive efficiency is dependent upon the successful communication between the two hemispheres of the brain; this function is deficient in DCD (Balance as the Central Component, 2004). Many studies have been conducted which link our understanding of neural networks and the mechanisms which permit the individual to perceive a sense of their position and movement (Johnson et al., 2008). One such research work is that conducted by Tallet et al (Tallet et al., 2013) investigating the developmental changes found in children with DCD who had problems with lateralised inhibition of symmetric movements. Normally functioning symmetric movement relies on efficient proprioception.

Fascia and fascial structures are already known to contribute significantly in the proprioceptive process (Langevin, 2006) because fascial membranes and deep superficial fascia are known to form a complex but integrated part of the locomotor system (Standring, 2008). The characteristic, continuous nature of the connective tissue of both the fascia and fascial structures act as a body-wide, mechanosensitive signalling system which performs a similar function to that of the nervous system, i.e. by integrating sensory information (Langevin, 2006). However, fascia alone cannot act as a functioning proprioceptive system without the presence of associated skeletal and muscular tissues (Van der Wal, 2009, Benjamin, 2009). For the proprioceptive information to be useful, the fascial structures themselves, together with their relationship to muscular and skeletal elements, must be present. It cannot simply depend upon topography (Van der Wal, 2009).

The fascial system is composed of both sensory nerve endings, which are mechanosensitive, and their associated sensory afferent neurons (Barker, 1974). These mediators of proprioception are stimulated by the mechanical disturbances in the joints and their surrounding tissues (Johnson et al., 2008) as could occur during the application of Fascia Bowen therapy. Subsequently, the information relayed to the brain permits the sense of position and movement to be registered. At brain level, this incoming information amalgamates with other sensory information derived from other sources e.g. such as the more specific proprioceptive sense organs of the labyrinth and skin receptors (Van der Wal, 2009) so that changes are effected. Mechanoreception information, required for efficient proprioception process to take place, not only comes from fascia and other connective tissue structures, but also from the touch information which is relayed from the skin receptors, muscles, the surfaces of the joints and the joint structures themselves. These, in turn, instigate mechanoreceptor triggering as a result of mechanical deformation such as that provided by the Fascia Bowen intervention has to occur. This, in the form of a tactile stimulus, stretches, squeezes or compresses. However, proprioception within fascia is not solely provided by mechanoreceptors located inside or attached to fascial structures, although the fascial architecture itself is a vital component in the process. Many fascial structures have a direct role in transmission (Benjamin, 2009), but it doesn't always follow that the connective tissue structures in and of themselves are equipped with a mechanoreceptive make-up (Van der Wal, 2009).

Many manual therapists focusing on treating fascia claim that they alter density, tension or flexibility of fascial tissue arrangement by applying different levels of manual pressure to the skin of the patient (Rolfe, 1977, Chaitow, 1980, Barnes and Marzano, 1990, Cantu and Grodin, 1992, Ward, 1993, Paoletti, 1998), e.g. as in the use of facial palpation methods. Further research needs to be conducted to verify these claims and to understand the physiological effects of targeting with fascia-based muscle mobilisation techniques as this may be of particularly relevance to those with DCD traditionally presenting with low muscle tone and poor physical fitness. For the purpose of this study the intervention protocol utilised one type of pressure.

Howard Plummer's Fascia Bowen teaching focuses on the importance of the primary connective tissue of the embryonic mesoderm's development as it represents an environment and a matrix within which the structures and organs of the body receive differentiation during development of the embryo (Van der Wal, 2009). The teaching is then coupled with a particular method of applying the treatment so that the therapist performs the procedures following the invisible dermatome lines of the body in order to stimulate each of the body's areas with the intention of producing maximum effect.

Fascia Bowen philosophy, in line with some osteopathic views, believes that the continuity and continuum of the connective tissue, or fascia in the human, is significant (Schleip et al., 2012). This view also corresponds with the belief that the mesoderm's principal function is mediating or connecting, binding, and disconnecting, shaping space and enabling movement. This view of the two patterns is synonymous with fascial anatomy (Van der Wal, 2009). A seemingly simple task like standing up without falling requires the integration of receptors in the skin as well as the involvement of connective tissue for the efficient planning and execution of both involuntary and voluntary movement (Gandevia, 2014). This is particularly relevant to individuals with DCD because they are already dysfunctional in the planning and execution of movement as well as proprioception. As fasciae display many different mechanical relationships with nearby tissues and those nearby tissues subsequently dictate or define proprioception, it follows that fascia as a whole and proprioception are inextricably linked.

2.5.2.3. Fascia Bowen and the Cerebellum

The Fascia Bowen therapy intervention protocol for this study (see Appendix 2) incorporates a treatment plan which is applied over every cutaneous area of spinal nerve innervation in the body, otherwise known as dermatomes. These include the cervical, thoracic, lumbar, sacral and coccygeal regions but specifically exclude the S3 and S5 regions in the research protocol, due to their proximity to the genitalia and the rectum. Cutaneous regions are supplied by nerve fibres from a single dorsal root and its ganglion and most dermatomes are supplied by the fibres of at least three to four dorsal roots (Grosz and Bakkum, 2000). Apart from the cutaneous regions receiving stimulation, both muscle and joint regions also receive stimulation as part of the treatment protocol. The invisible hoop-like dermatome presentation and the treatment applied are mirrored, meaning that the treatment direction remains constant rather than arbitrary in terms of its path.

Fascia Bowen is thought to produce mechanical stimulation to the connective or fascial tissue which, as previously stipulated, is a body-wide connective, architectural system under tension, with the result that it is believed to have wide-reaching effects when it is applied to specific parts of the body. The mechanical stimulation manifests at micro and macroscopic levels of the fascial architecture but may also include cell groups, tissues and organs which take into account the hierarchical principles of the body's assembly (Huang and Ingber, 2000). This is verified by anatomical analyses conducted on un-embalmed bodies which reveal the fascial system as a body-wide continuum. Additionally it also shows the fascial system as a movement continuum on both macroscopic levels, not only on fascia to bone connections, but also fascia-to-fascia transmissions in articular and intermuscular connections (Schleip et al., 2012). The tensional characteristics of the fascial system together with its mechanical forces at multiple levels in the body may provide an explanation for the global reaction in the fascial system as it responds to mechanical stimuli (Khalsa et al., 2000). This could be particularly significant to the understanding of how movement disorders can be addressed in therapeutic terms because local stimuli result in global effects and they may address underlying imbalance in function.

Advancements in neuro-imaging techniques over recent years have significantly assisted the scientific community in its understanding about dysfunction and damage in various areas of the brain. As a result of these new techniques, mechanisms and pathways potentially involved in Fascia Bowen’s ability to improve neuromuscular function in children with DCD could now be investigated more easily. The work of Proske and Gandevia for example (Proske and Gandevia, 2009) has shed some light on the important involvement of the cerebellum and parietal cortex in their ability to make multisensory comparisons by means of an internal forward feedback model during movements. The implications of motor command signal involvement in kinaesthesia, for example, have profound implications for certain clinical conditions (Proske and Gandevia, 2009). Any delay in feedback relating to interoceptive senses like heat detection or muscular activity could pose a significant danger to an individual with DCD e.g. in the acts of touching a hot kettle or crossing the road.

An fMRI imaging study investigated selective stimulation of muscle and cutaneous afferents (Wardman et al., 2014), and found that electrical stimulation of the index finger’s digital nerve and the area over the motor point of the first dorsal interosseous muscle evoked significant activation in the cerebellum (Proske, 2006, Proske and Gandevia, 2012). The two points of the hand mainly stimulated two areas of the brain responsible for motor control and for the planning and execution of movement, specifically the cerebellum and the insula. These two brain areas are believed to play a role in self-awareness, perception and motor control, limb and joint position or proprioception, all dysfunctional in DCD, related specifically to the ipsilateral cerebellum. However, while the Wardman et al (2014) study findings highlight that muscle stimulation has a greater effect on the brain than the effects of cutaneous stimulation in terms of intensity, they are both highlighted as being important. This seems to assist in underpinning the potential importance of both muscle and cutaneous stimulation for those with DCD who struggle with awareness, limb positioning or execution of planned movements. Importantly, the fascia Bowen intervention in this research study stimulates both these regions and while Warman et al do not suggest that chosen stimuli can ignite dormant or absent processes their study does assist in understanding regarding connectivity between peripheral stimulation and specific brain regions involved in aspects of motor control and movement (Wardman et al., 2014). It is important to acknowledge that any sensations arising from the application of a therapeutic pressure or stroking may have an impact on the brain and that this, in turn, could modify an individual's perceptions (Moseley et al., 2012). This type of intervention could, potentially, benefit those with DCD. Moseley et al's concept of a cortical body matrix, or virtual body map in the brain (Moseley et al., 2012), suggests that there is a dynamic neural representation within the brain which integrates sensory data with homeostatic and motor function. How therapeutic load, whether compression, manual strokes or stretching, relates to this matrix may be significant therapeutically for the Fascia Bowen intervention and in view of this, more robust studies need to be conducted in this area.

2.5.3. Current Evidence Base

No previous studies have been conducted using Fascia Bowen therapy as an intervention, which is why the current one was undertaken. However there are some studies about the Bowen technique and, as previously stated, practitioners of Fascia Bowen must be qualified in the administration of the Bowen technique before being permitted to qualify as a Fascia Bowen practitioner. As Fascia Bowen is a derivation of Bowen therapy, it is relevant to explore the existing evidence base for Bowen in lieu of research directly investigating Fascia Bowen therapy.

In 2011, a systematic review was conducted to answer the question about what Bowen work is but also to investigate the quality of methods utilised within Bowen research (Hansen and Taylor-Piliae, 2011). This was done by searching the computerized databases for literature published between 1985 and 2009. From just over three hundred papers identified, only fifteen complied with the inclusion criteria, namely that they must include references to the original Bowen work, that the research provided outcomes relating to health, and that they also showed both quantitative and qualitative data. The types of papers included were those using RCTs, quasi-experimental designs, mixed-methods, cross-sectional designs and case-study designs and the authors reported that, of the studies reviewed, varying degrees of methodological and design problems were detected including sampling technique issues and incomplete procedural descriptions. Additionally, a lack of standardized measurement tools were utilized in the papers. Just over half the studies reported that Bowen work was successful in improving a range of different conditions from chronic to acute, but some of the studies demonstrated that it also reduced symptoms of pain (Hansen and Taylor-Piliae, 2011), e.g. as in the studies by Carter (2001, 2002) on the effects of the use of Bowen therapy on frozen shoulder, pain and perceived function (Carter, 2001, Carter, 2002). Over 33% percent of studies using Bowen therapy reported that the intervention had improved mobility, and several papers reported symptom relief outcomes especially in the case of people with chronic conditions. Conclusions regarding efficacy of the reviewed papers indicated that there is a need to improve the methodological and design quality of Bowen work research but there are some positive indications about efficacy. With improved methodological and design components it would be possible to explore the effect of Bowen work in a valid, rigorous manner to achieve a clearer picture of its efficacy (Hansen and Taylor-Piliae, 2011).

In a RCT (Marr et al., 2008), which was conducted amongst 116 community dwelling volunteers to assess the effect of Bowen work on hamstring flexibility, found that hamstring problems are often implicated in other dysfunctions such as lower back pain and dysfunction of movement in the individual. An electrogoniometer was used to measure hamstring flexibility pre and post intervention, and the results showed that the participants experienced significantly better flexibility as a result of the intervention.

Within the papers originally earmarked for inclusion within the systematic review referred to earlier (Hansen and Taylor-Piliae, 2011), it is apparent that many studies were conducted to investigate one of the signature treatments of Bowen effectiveness, namely for the treatment of frozen shoulder problems. Of those identified as conforming to the inclusion criteria the data revealed that Bowen therapy was shown to be effective in relieving pain symptoms and mobility in various conditions such as frozen shoulder, pain symptoms in migraines, and relief of the symptoms found in those with chronic illnesses such as multiple sclerosis.

The above suggests that research already exists which demonstrates the effectiveness of Bowen in treatment designed to improve a number of symptoms, conditions and overall wellbeing. This is important because Fascia Bowen is a treatment modified from the main Bowen technique and many of the Bowen procedures for this thesis' study are contained within the Fascia Bowen research protocol. The difference is that Fascia Bowen is even lighter than Bowen therapy; the lighter touch may be what is needed for children who may have hypersensitivity to touch. The other difference is that Bowen treatment requires 2-3 minute pauses between the administrations of certain moves (European College of Bowen Studies Ltd., 2002, Hansen and Taylor-Piliae, 2011). In practice, assessment of children with conditions such as ADHD, autism, DCD, as well as subjective observation in clinics over the years, has revealed that children in general, whether they have complex conditions or not are not always sufficiently patient to remain lying on a treatment bed for a session which includes minutes of pause between treatment moves, and so the fascia Bowen is provided with continuous gentle moves and this thesis' intervention protocol did include only one pause (see Appendix 2).

What is required is that all CAM research utilises sound methodology so that more therapeutic interventions can be investigated thoroughly.

2.6. Statement of Research

The aim of this study is to evaluate the effectiveness of Fascia Bowen as an intervention for children with DCD, both at a physical and psychological level. It is a novel research area which has not previously been tested scientifically; however, the therapy is not new. Currently, only anecdotal evidence exists regarding its effectiveness, and this has been collected from the Fascia Bowen children's clinics throughout the UK, from the practitioners administering the treatment, parents, carers and teachers over a period of 15 - 20 years (Bowen Therapy Professional Association, 2012c). This study specifically assesses the effectiveness of Fascia Bowen for children with DCD in the following areas:

- neuromuscular function
- motor skills function
- scholastic function-attention, concentration span, handwriting and work completion rate
- social interaction
- self-esteem
- behaviour.

2.7. Summary of Literature Review

Within this literature review terminological issues were highlighted as continuing to prevail within the scientific community in relation to dyspraxia and DCD. The lack of terminological standardisation, identified in up to a quarter of the literature relating to this topic, causes confusion for lay people and professionals with some literature reviews identifying as many as 70 search terms in an attempt to pool all the relevant literature to achieve coherence regarding the condition. Many individuals involved in different fields of specialisation, including medicine, as well as those involved in support networks and education, continue to use the term dyspraxia, maintaining that there are profound differences in the symptoms of dyspraxia and DCD. They maintain that dyspraxia should receive a separate classification within the DSM-V which currently it does not have. Apart from terminological difficulties political correctness has also become an important theme in today's research and practice. Particularly evident is that the most recognised term previously for dyspraxia, namely 'clumsy child syndrome', is no longer acceptable as it is too sensitive to be utilised. Generally, in medical and diagnostic practice, DCD has therefore become the adopted term for diagnosing those failing to acquire their fine and gross motor skills in accordance with levels expected for their chronological age. For the purpose of this thesis therefore, despite the profoundly differing views held within the scientific community and the potential impact of that on the topic of this thesis, a decision was made to utilise the term DCD. However, in an attempt to address comprehensively and robustly the problems referred to above, a systematic review highlighting the 70 terms was identified and referenced. All the search terms were then utilised to locate appropriate literature dating back to when it was not considered politically incorrect to use certain terms, and up to the present day literature which largely, but not wholly, uses the term DCD (see Appendix 3 for literature review search terms and procedure).

The symptoms of dyspraxia/DCD are numerous, but primarily refer to the under development of fine and gross motor skills, clumsiness and poor posture. Any intervention study investigating this condition would need to show improvement in neuromuscular function, which is movement skill, but also in motor skills functioning, which relates to how the improvements in fine and gross motor improvements equate to everyday living i.e. improvements such as might be found in activities like tying shoelaces. This study will therefore aim to measure both neuromuscular function and motor skills functioning.

Apart from the core symptomology, there are often other issues which are prevalent in children with dyspraxia/DCD such as inappropriate behaviour, self-esteem, lack of socialising skills, school life issues both in the playground and in the classroom, family relationships and general wellbeing both in the present and future. Based upon this information it is important that an intervention addresses and improves these components. This study will measure this issue.

Within any literature review it is impossible to ignore that according to the Dyspraxia Foundation and scientific literature, 50% or more of individuals with dyspraxia/DCD will have overlapping conditions such as ADHD or/and ASD. As a result, potentially confounding variables may be introduced into the research, and this is why a measure will be incorporated to screen for ASD.

The issues which will be explored will relate to the potential causes of DCD namely those from a genetic, environmental, neural, visual-motor and sensory-integration dysfunction standpoint. As sensory integration difficulties are often implicated in the condition this has led to the selection of the intervention highlighted in the title of this thesis, namely Fascia Bowen, which is anecdotally implicated in improvement of areas of dysfunctions such as those highlighted above.

The efficacy of existing interventions were explored and it was found that there is a far greater evidence-base in place for top-down approaches in the treatment of DCD with less exploration having taken place about bottom-up approaches. This study aims to add to the research base on bottom-up approaches, as Fascia Bowen could be considered to be in this category. Additionally, the study will endeavour to expand the efficacy research for Fascia Bowen as currently there is only anecdotal evidence to recommend it. Despite the lack of research base, Bowen therapy, from which Fascia Bowen is derived, has already been the topic of numerous efficacy studies and these have been explored within this literature review.

While investigating the efficacy of Fascia Bowen, which is a CAM therapy, the study also highlights an important issue which is discussed here, namely the issue of patient choice which is a core concept within the NHS. CAM, in general, is under-researched, and this is discussed together with its use in the treatment of DCD, so another expectation of the study is to expand the knowledge base for CAM therapy.

Of the ideas presented within the literature review, one idea is that Fascia Bowen could improve neuromuscular function based on the impact it has on proprioception and thus sensory integration issues. Bearing this in mind, along with the lack of efficacy research which exists about Fascia Bowen, this study aims to begin to address this and whether, as the title of this study suggests, it can improve neuromuscular and psychological function in boys with dyspraxia DCD (between the ages of 8 and11) at primary school.

3. Methods

3.1. Research Aims

The aim of this current study was to evaluate the effectiveness of Fascia Bowen as an intervention for children with DCD both at a physical and psychological level. This study specifically assessed its effectiveness in the following areas which were measured before and after the therapy:

- neuromuscular function
- motor skills function
- scholastic function-attention, concentration span, handwriting and work completion rate
- social interaction
- self-esteem
- behaviour.

3.2. Research Design

The original aim of this study was to conduct a randomised control trial which would have incorporated 30 participants, 15 for the control group and 15 for the intervention group; however, this was not possible due to recruitment issues which will be described in the discussion section of this thesis. This research project was a one-armed pilot study, using a pre-post-treatment methodology. Despite the original intentions, it is important to note that conducting a pre-post (phase 1) study, according to the MRC, is the ethical and appropriate design to commence this type of research before moving to any RCT. The advantage of this would be to provide the evidence of effect to inform any RCT (MRC, 2000).

Male participants between 8-11 years old were assessed before and after they received 6 sessions of Fascia Bowen therapy in order to assess change in neuromuscular function, motor skills function, scholastic function, social interaction, self-esteem and behaviour. The reason for conducting the research intervention over a 6 week period was as a result of a fact-finding exercise undertaken by the researcher. This was done prior to the study's recruitment phase. During this time school teachers and parents were asked how long they would be prepared to commit to research study. Their replies focused on the length of the term times which, if 8 weeks in length, would allow for the whole study to be commenced and completed within the one school term without the need to interrupt the intervention schedule due to holiday times. Most of the children received their intervention during school hours so this was a very important consideration during the research preparation stage.

3.3. Ethical Approval and Recruitment

Full ethical approval for the study was granted by the University of Bath Psychology Ethics Committee, and communicated to the author on the 29th November 2013, under reference number 13-131 (see Appendices 4-6).

Exclusion criteria included the presence of the co-morbid conditions, namely hemiplegia and cerebral palsy, if participants were non-ambulant (i.e. unable to walk or move under their own volition). Girls were excluded due to differing developmental milestones between males and females and while differences pre-puberty are moderate they are more likely to reflect environmental influences such as those which are socially induced by parents, peers, teachers and coaches (Thomas and French, 1985).

A further exclusion criteria was that all participants were without intellectual disability, as indicated by a statement of special educational need (or absence thereof). Additionally, none of the participants was receiving any other form of intervention before or during the intervention period.

Participants were recruited from mainstream primary schools by contacting the head teachers of local schools with initial information (see Appendix 7), posting information on Berkshire local towns' Facebook sites, with dyslexia groups and through an independent OT colleague of the OT conducting the pre and post assessments. If schools registered interest then research information sheets for parents/guardians and child (see Appendices 8 and 9), together with consent forms (see Appendix 10), were sent out to each participating school for onward transmission to the suitable parents/guardians of children with DCD.

Parents/guardians considered the research, and indicated consent by returning the consent form to the researcher using the pre-paid envelope supplied. The parents indicated consent by completing, signing and dating the consent form. The consent forms were returned to the researcher direct stating that they fully understood the purpose of the research, that their involvement would be entirely voluntary and that they could withdraw at any time as detailed in the parent and child information sheets. The children gave their assent to take part in the study when they first met with the OT.

3.4. Assistants

The OT was recruited having heard about the research project via a colleague working with Berkshire Blind Society members and the West Berkshire Council. The OT approached the researcher by email to enquire about the project and the highest category of disclosure and barring application (permitting work with vulnerable minors) was made through the University of Bath administration section.

The OT qualified from the Welsh School of Occupational Therapy in 1993 with a Diploma of the College of Occupational Therapy and is registered with the Health and Care Professions Council. She is a member of the British Association of Occupational Therapists and in addition, the specialist sections for Children and Young People as well as Independent Practice. She also has membership of the Sensory Integration Network. At the time of the research she was working part-time for the West Berkshire County Council. She received her training in how to conduct the MABC assessments through her daily occupation's continuous professional development requirements. An unannounced spot check was conducted by the researcher to view one of the assessments conducted by the OT. This was observed through an office window adjoining the assessment room to avoid disrupting the assessment process. The researcher found that the OT was complying fully with the instruction manual, which explains fully how to conduct an assessment.

Fascia Bowen practitioners were recruited through Fascia Bowen teaching staff so that children could be seen in the different locations for treatment declared in the ethical application approval. The six, including the researcher, completed disclosure and barring applications, to permit them to work with vulnerable minors. The applications were processed via the University of Bath's administration department. All of the practitioners had registered Bowen therapy and Fascia Bowen practitioner status having followed intensive training programmes to qualification via the European College of Bowen studies and the Howard Plummer Fascia Bowen level 1 and 2 training programmes. Each practitioner followed one treatment protocol. During the pre-data collection stage all Fascia Bowen practitioners attended research intervention protocol meetings to ensure that every practitioner used the same intervention procedures and that differences in the pressure applied when performing the fascia Bowen remained consistent throughout the research intervention period. The researcher supervised the training process and conducted spot-check visits to ensure that the treatment was conducted according to the training protocol. To avoid disrupting the treatment session the researcher viewed the sessions through the classroom window. Only two practitioners, including the researcher, of the six available were utilised due to their favourable geographical locations and proximity to the schools and private clinics utilised. The researcher was not spot-checked, but in view of her disability she was unable to deviate from the learned protocol and so she conducted the intervention sessions as she had been trained.

The research assistant was recommended to the researcher by the director of a centre providing treatment and rehabilitation interventions for adults and children in Newbury, Berkshire. This is where she heads the administration, financial accounting and patient liaison aspects of the business. She gained an honours degree at Bachelor level in History via Warwick University. This included some research exposure. She has been a member of the Parent Teacher Association for a local Newbury primary school for some years. She received training for her research assistant’s role in the current research project from the researcher and author of this thesis. Spot-checks were conducted during her telephone calls with parents pre and post intervention period, to ensure that all instructions were followed according to the training. The researcher, who had provided the training, remained silent during attendance throughout one of the pre and post intervention telephone calls with parents. It was found that the assistant was adhering fully to the training she had received.

3.5. Participants

10 males aged 8-11, with a mean age of 116.2 months (SD) of 14.45 months) diagnosed with DCD, or previously assessed by an OT with MABC-2 scores of at or below 15th centile, were recruited to take part in the study. The 15th centile was selected because the MABC-2 manual utilises a 'Traffic Light' system to explain a child's total test score in terms of categories of difficulty. Red means at or below 5th percentile which denotes a significant movement difficulty, amber means between the 5th and 15th percentile and suggests the child is 'at risk' of having a movement difficulty, green means above the 15th percentile denoting no detected movement difficulty. The mean MABC percentile score of participants was 4.6, with a range of 0.5-9 (SD=3.53). All participants came from mainstream schools.

3.6. Measures

3.6.1. Children

3.6.1.1. Motor Function

Motor function was assessed pre-and post-intervention using the Motor skills Assessment Battery for Children 2 (MABC-2) (see Appendices 11 and 12) (Henderson, 2007). The MABC is designed for the identification and description of impairments in motor performance of children from 3 years through to 16 years of age. The MABC-2 manual reports it as being a clinically useful instrument for children and adolescents with impairments in motor skills (Brown and Lalor, 2009) and is an internationally recognized tool used in at least 500 published research papers (Pearson Education Limited, 2014a). Its manual reports that its reliability and validity are satisfactory (Henderson, 1992, Asonitou et al., 2012); however, this information relates to the first version of the MABC and minimal information is available regarding the MABC-2 (Schoemaker et al., 2012) although preliminary reliability and validity are reported for it by Henderson (Henderson, 2007). In a Taiwanese study with 144 child participants it was reported as a reliable and valid measure to assess motor competence in children with DCD, but also an excellent and stable test re-test reliability even over a 20 day period with an intraclass correlation coefficient of 0.97 (Wuang et al., 2012).

The MABC-2 takes 30-40 minutes to complete and involved 8 tasks covering manual dexterity, ball skills, static and dynamic balance. For manual dexterity the children completed 3 tasks which included placing pegs in holes using the preferred hand; the task was repeated using the non-preferred hand, threading a lace and drawing a trail. The catching task involved two tasks, catching a ball with two hands and throwing a beanbag onto a mat. The balance assessment involved three tasks requiring the children to balance on a balance board using the preferred leg and then followed by performing the same task using the non-preferred leg. This was followed by walking heel-to-toe forwards, hopping on mats using the preferred leg and then hopping on mats using the non-preferred leg.

Scores from all these tasks were converted into centile scores. The MABC-2 manual utilises a ‘Traffic Light’ system to explain a child’s total test score in terms of categories of difficulty. Red means at or below 5th percentile which denotes a significant movement difficulty, amber means between the 5th and 15th percentile and suggests the child is ‘at risk’ of having a movement difficulty, green means above the 15th percentile denoting no detected movement difficulty.

The assessment, both pre and post, was carried out by one qualified Occupational Therapist (OT). Administration of this measure requires qualification as a medical professional i.e. Dr, Nurse, OT. The OT in this study performed this assessment on a regular basis as part of her standard daily practice.

3.6.1.2. Self-Esteem

Self-esteem was measured pre-and post-intervention using the Self Perception Profile for Children (SPP) (see Appendix 13) (Harter, 1985) which has been reported in the SPP manual to have good reliability and validity in many studies (Harter, 1985, Valentini et al., 2010). Internal consistency was measured over 8 samples and all subscales across all samples returned Cronbach's alpha's of at least 0.7. The manual does not advocate test-retest statistics as self-perception is expected to change over time. Validity is more difficult to judge in such an abstract concept as self-perception; face validity, however, is good, as all the items directly ask about the underlying construct. The SPP is a self-report questionnaire which has five subscales covering perceived domain-specific scholastic competence, social acceptance, athletic competence, physical appearance, and behavioural conduct, as well as overall self-worth. There are 6 items for each of the 5 subscales, a total of 30 items. The SPP uses a 'structured alternative format' whereby each item contains two associated statements, each statement having a choice of two responses each, thereby providing a four point scale for each item. Scores can fall between 1 and 4 and a mean is calculated, giving a mean score out of a possible 4 for each of the 5 subscales. This is a self-completed questionnaire which requires no standard level of training or competence to administer.

3.6.1.3. Social Skills

Self-rated social skills were assessed pre-and post-intervention using the Spence Social Skills Questionnaire-Pupil (SSQ-Pu) (see Appendix 14) (Spence, 1995) whose reliability and internal validity have been found to be good with a Guttman split-half reliability of 0.83 (Spence, 1995).

This is a 30 item questionnaire using a 3-point Likert-type rating scale. The item has 3 subscales covering conflict resolution/avoidance, warmth and empathy and social involvement. Participants can score up to 20 in each subscale with a higher score indicating a higher level of social competence. The three subscale scores can be combined to produce a total score.This is a self-completed questionnaire which requires no standard level of training or competence to complete. The researcher trained the OT to assist the child with the completion of this measure e.g. help with reading.

3.6.2. Teacher

3.6.2.1. Scholastic Function

As no short, validated scholastic function measure was identified, an appropriate questionnaire was designed by the researcher (see Appendix 15). This consisted of 4 Likert scales to measure attention, concentration span, handwriting and work completion rate pre-and post-intervention. From the literature review it was established that children with DCD struggle in these particular areas of function. It was therefore considered important that a measure should be designed to assess these areas. Importantly, consideration was paid during the design process to the limited time available to teachers for the purpose of completing questionnaires, and therefore a Likert scale seemed to fulfil the requirements for time in that it was quick and easy to complete.

The scale was rated from 1-5. 1 meaning “Very poor”, 2 meaning “Poor”, 3 meaning “Barely acceptable”, 4 meaning “Good” and 5 meaning “Very good”. The attention scale asked how the child had focused in lessons within the last 2 weeks. The concentration span asked for how long the child had concentrated during lessons in the last two weeks. The work completion rate asked how quickly the child had been completing his work in the last two weeks and the handwriting quality asked about the child’s writing quality in the last two weeks.

3.6.2.2. Social Interaction

Social interaction was measured using the Spence Social Skills Questionnaire - teacher version (SSQ –T) (see Appendix 16) (Spence, 1995). This is a parallel version to the child measure. The internal consistency and validity were found to be good with a Guttman split-half reliability of 0.93. It also has good construct validity (Spence, 1995).

This is a 30-item questionnaire using a 3-point Likert-type rating scale. The item has 3 subscales covering conflict resolution/avoidance, warmth and empathy, and social involvement. A score of up to 20 can be achieved for each subscale, with a higher score indicating a higher level of social competence. The three subscale scores can be combined to produce a total score.

3.6.2.3. Behaviour

Behaviour was measured using the Strengths and Difficulties Questionnaire - teacher version (SDQ-T) (see Appendix 17) and the reliability and validity found to be satisfactory (Hawes and Dadds, 2004). Internal consistency showed Cronbach’s Alphas which ranged from 0.59 to 0.80 indicating moderate to strong reliability across all the items. Test-retest reliability was excellent over a period of 12 months, with correlation coefficients ranging from 0.61-0.77 across the subscales. Concurrent validity was measured by comparing scores to related clinical diagnoses (for example ADHD for the hyperactivity scale) and was found to be strong with Odd's ratios between 2.3 and 30.5 (Hawes and Dadds, 2004). The SDQ measures 5 subscales covering emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and pro-social behaviour. It has 25 items in the format of a 3 point Likert scale. Each subscale produces a score out of 10 with the higher score indicating a higher level of difficulty – except in the case of the pro-social score, where a higher score indicates a better level of social functioning.

3.6.3. Parents

3.6.3.1. Motor Skills Function

The Developmental Coordination Disorder Questionnaire - parent version (DCDQ-P) (see Appendix 18) (Wilson et al., 2009) measures the child's motor performance in everyday functional activities using 15 5-point Likert scales. It is factorised in to "control during movement" with a score out of 30, "fine motor and handwriting" with a score out of 20 and "general co-ordination" with a score out of 25 and a total out of 75, where higher scores indicate competence. Its reliability and validity are reported to be strong (Wilson et al., 2000).

3.6.3.2. Self-Esteem

Self-esteem was measured using The Self Perception Profile for Children (SPP) (see Appendix 19) (Harter, 1985). The SPP is a questionnaire suitable for parents and teachers which has five subscales which cover perceived domain-specific scholastic competence, social acceptance, athletic competence, physical appearance and behavioural conduct and one scale assesses overall self-worth. The parent and teacher measure is a parallel version to the child version. There are 15 items, three per domain. The SPP uses a structured alternative format whereby each item contains two associated statements, each statement having a choice of two responses each, thereby providing a four point scale for each item. Scores can fall between 1 and 4 and a mean is calculated, giving a mean score out of a possible 4 for each of the 5 subscales. Its reliability and validity are reported as acceptable (Boyle et al., 2008).

3.6.3.3. Social Skills

Social skills was assessed pre-and post-intervention using the Susan H. Spence Social Skills Questionnaire-Parent (SSQ-P) (see Appendix 20) (Spence, 1995) which is a parallel to the child version. This is a 30 item questionnaire using a 3-point Likert-type rating scale. The item has 3 subscales covering conflict resolution/avoidance, warmth and empathy, and social involvement. A score of up to 20 can be achieved for each subscale, with a higher score indicating a higher level of social competence. The three subscale scores can be combined to produce a total score. Its reliability and internal consistency was found to be good with a Guttman split-reliability of 0.90 (Spence, 1995).

3.6.3.4. Behaviour

Behaviour was measured pre- and post-intervention using the Strengths and Difficulties Questionnaire (SDQ) (see Appendix 17) (Goodman, 1997) Its reliability and validity were considered to be satisfactory (Hawes and Dadds, 2004). Internal consistency showed Cronbach’s Alphas which ranged from 0.59 to 0.80 indicating moderate to strong reliability across all the items. Test-retest reliability was excellent over a period of 12 months with correlation coefficients ranging from 0.61-0.77 across the subscales. Concurrent validity was measured by comparing scores to related clinical diagnoses (for example

ADHD for the hyperactivity scale) and was found to be strong with Odd's ratios between 2.3 and 30.5 (Hawes and Dadds, 2004). The SDQ measures 5 subscales covering emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and pro-social behaviour. It has 25 items in the format of a 3 point Likert scale. Each subscale produces a score out of 10, with the higher scores indicating a higher level of difficulty – except in the case of the pro-social score, where a higher score indicates a better level of social functioning.

3.6.3.5. ASD Screening

ASD screening was introduced into the study in view of the link which exists between DCD and ASD (American Psychiatric Association, 2013). It was important to introduce this screening tool so that children with ASD could be identified as their differing sensitivities could have affected the results across measures.

The screening tool utilised for this was the Social Communication Questionnaire (SCQ) (see Appendix 21) by Michael Rutter, M.D., FRS, Anthony Bailey, M.D., and Catherine Lord, Ph.D., is a 40-item, parent-report screening measure that taps the symptomatology associated with ASD. The items are administered in a yes/no response format which can be completed by the parent in less than 10 minutes and scored by the administrator in 5 minutes. Its completion refers to the individual's entire developmental history, and the results produced are pertinent to referral for more complete diagnostic workup. This was completed pre-intervention. This measure was selected for its excellent sensitivity and specificity in screening for ASD symptomology (Chandler et al., 2007).

3.6.3.6. Qualitative Parent and Teacher Feedback

At the beginning of the study when the consent forms were returned the researcher telephoned the parents as a matter of courtesy to confirm receipt of the forms and to confirm the arrangements for the start of the intervention specifically in relation to dates. At the same time the researcher requested whether the parents would be happy to make notes about anything they felt they wanted to convey regarding their child as the intervention process went on. The parents agreed that this would be in order, and the research assistant was instructed to requests the return of the notes direct to the researcher at the end of the week 8 telephone conversation to complete the post intervention measures. This was done and in turn, the parents either emailed or sent a written sheet by post with any points they had recorded. The parents received no guidance on the expected content or structure of their communication.

3.7. Method

The data collection began in October 2013 and continued until June 2014. All data was collected and analysed before August 2014.

3.7.1. Pre-Study

The researcher trained the OT to assist the child with the completion of this measure, e.g. help with reading.

3.7.2. Pre-Treatment Assessments

The pre-treatment assessments took place in schools for 9 participants and one participant was assessed at home at the request of the parent.

An OT completed the Motor skills Assessment Battery for Children 2 (MABC-2), the Self Perception Profile for Children

(SPP-child) and Spence Social Skills Questionnaire-Pupil (SSQ-P).

The OT gave copies of the teacher measures to an appropriate member of school staff. These measures include the scholastic function measure, the Spence Social Skills Questionnaire - teacher version, and the Strengths and Difficulties Questionnaire - teacher version (SDQ-T).

A research assistant contacted the parents/guardians of the participants by telephone to complete the Spence Social Skills Questionnaire-Parent, Developmental Coordination Disorder Questionnaire - parent version, the Self Perception Profile for Children, Strengths and Difficulties Questionnaire, and Social Communication Questionnaire by telephone. This was the most efficient mode of communication because the parents/carers were geographically dispersed. Whether the parents' reporting their child's difficulties by speaking over the telephone instead of writing them down had any impact on the study was not taken into consideration.

3.7.3. Intervention

In weeks 2-7 of the study for each child the intervention took place. The intervention sessions took approximately 45 minutes and each participant received one session per week for a total of 6 weeks. In the event that a child was ill or absent from school, the child continued with the next scheduled session at the next available time i.e. each participant received 6 sessions, but this may have been over 7 or more weeks. The children received the Fascia Bowen intervention individually from a qualified therapist each week for 6 weeks. Practitioners followed a standardised treatment protocol regime devised by Mr Howard Plummer, the only teacher of Fascia Bowen therapy in the UK. (See Appendix 2). The children received their treatment lying in both prone and supine positions according to the fascia Bowen protocol instruction sheet. Sessions took place in a private room in the child's school or a non-NHS clinic, depending on which option was most convenient for the participant and their family.

3.7.4. Post-Treatment Assessments

In week 8 the participant assessments were carried out again with the children, teachers and parents/guardians.

3.7.5. Post-Study

After taking part in the research study, participants received a de-briefing sheet that completely explains the nature and purpose of the research study (see Appendix 22).

If parents/guardians requested, the researcher provided individual feedback concerning all conducted assessments.

3.8. Ethical Principles and Issues

The study conformed fully to the Good Clinical Practice (GCP) directives and guidelines, whose aim it is to ensure that each subject comes to no harm. No safeguarding issues occurred throughout the course of the study. The rights of all participants were protected as was the trial's data at all times. Any personal details were, and continue to be, treated with the utmost confidentiality with all paperwork held in a locked cabinet for the duration of the research study and for the statutory minimum period after the conclusion of the study as previously declared. The parents/guardians were asked to sign a consent form so that their children could participate in the study and the children gave their verbal assent to take part in the study. All those involved in the study were given a month before the trial began to permit them to make any enquiries relating to what would take place within the study and what the objectives of the study were. The information about the trial, together with any consent forms, were worded simply and accordingly with no use of jargon or technically confusing information included. All terms were explained fully in the ‘Information to participants’ letter.

No participants were prevented from receiving treatment-as-usual and prior to the commencement of the study no participant was receiving any other intervention. By the 2nd intervention session participant 7 had broken his arm and was duly referred to a physiotherapist, for therapy, by his General Medical Practitioner. His medical treatment involved the administration of cold, machine based application on the affected arm. He was not prevented, by the research team, from receiving his further treatments due to ethical considerations of allowing treatment-as-usual to run alongside necessary medical recommendations.

No pressure was placed upon the participants to continue or to withdraw from the trial and issues of this nature did not occur during the course of the study. If any of the information sheets or consent forms were revised with new and important information then these would have been submitted for further ethical approval by the ethics committee before continuing. However, no issues of an ethical nature calling for re-submission and approval occurred during the course of the study.

The research conformed to the Declaration of Helsinki (Association, 1964 but revised in 2008) and Good Clinical Practice (GCP) (GCP, 2006) governance procedures, prioritising, at all times, safety and confidentiality. No issues relating to governance, safety and confidentiality occurred during the course of the study or following completion of the study.

A file was compiled, detailing every stage of the investigation and progress of the subjects through the experimental procedures.

During the study the children, parents/guardians and teachers were asked to feedback information to the researcher and practitioners in order to elucidate psycho-social factors influencing their physical activity profiles. They were also asked to complete questionnaires in the first and eighth week of the study with the research assistant. At no time were the parents/guardians or participants placed at risk and no safeguarding issues occurred throughout the course of the study. All participants were treated with respect and their dignity was protected at all times.

Particularly important to the research team was the consideration that children are vulnerable and are often eager to please adults, and so careful consideration was always given to ensure that the relationship between the participants and researcher conformed to the highest standards and maintenance of professionalism at all times. The responsibility for the participants' safety always rested with the professional in charge and not with the participants. All of the children's responses were kept confidential unless they disclosed risk of harm to themselves or others. This would also include a disclosure of very low mood or safeguarding issue during assessment or intervention. No issues relating to low mood or safeguarding issues arose during the study. In the event that any issues of this nature had arisen then the practitioner would have been duty-bound to inform the researcher who, in turn, would inform the parent/guardian (unless the risk of harm was from the parent/guardian) or the research supervisor. Every OT and practitioner involved in the research had full Disclosure and Barring certification and all were fully qualified in their field of expertise. Each Head teacher was given a copy of the

Disclosure and Barring certification for each practitioner who worked with the children in their school. The parent/guardian of each child was informed that they would have access to the certification via the school head teacher or from the researcher upon request. Information about this process was included in the information sheet for parents/guardians. At no time did a parent or guarding request the Disclosure and Barring certification.

The rights of the participants were protected at all times so that they could withdraw from the study at any point. The relationship between participant and researcher did not change and no participant withdrew from the study. There was therefore no attrition rate to consider within the study's data collection and analysis. Consideration was given to the possible negative impact on the child's self-esteem and/or academic progress by removing him from the class environment, for an hour or less, on a weekly basis over 8 weeks. If the child, parent or teacher reported that a negative impact was outweighing the positive effect of the study then the child will have been withdrawn from the study immediately; however, no negative impact occurred throughout the course of the study.

As this study involved vulnerable participants who were also minors, consent for participation was gained from the parent or guardian before the study commenced. The participants were told that they had the right to know the study's outcome. Within the protocol any information regarding funding, any sponsorship, institutional affiliations, conflicts of interests, participant incentives or compensation was expected to be declared. None of these particular issues arose during the study's duration and so there was nothing to declare. The effects of the intervention were continuously evaluated and full ethical approval was in place before the research commenced.

This was granted by the University of Bath's Psychology department ethics committee (see Appendices 4-6).

3.9. Statistical Analysis

All results were analysed using the Statistical Package for the Social Sciences (SPSS) version 21. (For full output see Appendix 23).

3.9.1. Neuromuscular Function

A one-way repeated measures MANOVA was conducted on the mean scores of the 3 subscales of the MABC-2 (manual dexterity, aiming and catching, balance) as a combined measure of Neuromuscular function over time (pre-and post-intervention)

Individual centile scores were examined visually using the MABC-2's traffic light system.

3.9.2. Social Interaction

A 2-by-3 mixed ANOVA was conducted using the total SSQ scores between time (pre-and post-intervention) and respondent (parent, pupil, teacher).

3.9.3. Self Esteem

A mixed MANOVA was conducted between time (pre-intervention and post-intervention) and respondent (parent or pupil) on all 5 subscales of the Self-Perception Profile (SPP) (scholastic competence, social acceptance, athletic competence, physical appearance, behavioural conduct) to provide a combined measure of Self Esteem.

The Global Self-Worth scale of the SSQ is only available on the Pupil version, therefore a paired samples t-test was conducted pre-and post-intervention.

3.9.4. Motor Skills Function

A MANOVA was conducted on the 3 subscales of the DCD-Q

(control movement, handwriting, co-ordination) to provide a combined measure of Motor Skills Function over time (pre-intervention and post-intervention).

3.9.5. Behaviour

A mixed ANOVA was conducted between Time (pre and post) and respondent (teacher or parent) on the total of the difficulty scales of the SDQ.

A separate mixed ANOVA was conducted between respondents (teacher or parent) and time (pre and post) on the SDQ pro-social subscale as the manual states that this scale cannot be combined with the other SDQ scales to create a meaningful total.

Follow-up post-hoc tests were conducted.

4. Results

The Fascia Bowen intervention was scheduled to take six weeks with each child receiving one treatment per week. In the application for ethical approval a longer intervention time was accommodated should any child be unwell, absent from school, or on school holidays. Of the 10 children receiving the intervention 9 received one each week but 1 child (participant 4) received his 6 treatments over an 8 week period due to illness and absence from school. On average therefore the children received their interventions over 6.2 weeks

4.1. Neuromuscular Function

The pre-intervention aiming and catching variable from the MABC was positively skewed (Kolmogrov-Smirnov (KS) (10) =.303,p=.10). All others were normally distributed. A MANOVA was chosen due to robustness (GLASS et al., 1972). A one-way repeated measures MANOVA was conducted on the 3 subscales of the MABC-2 (manual dexterity, aiming and catching, balance) over time (pre- and post-intervention). See Table 1 for scores:

MABC-2 subscales							
			95% confidence interval			95% confidence interval	
		Mean (SE)	Lower	Upper	Mean Difference (SE)	Lower	Upper
Manual Dexterity	Pre	4.15 (1.02)	1.85	6.45	10.85 (4.39)	0.91	20.79
	Post	15.00 (4.75)	4.27	25.73			
Aiming and Catching	Pre	11.40 (3.79)	2.83	19.97	15.45 (5.36)	3.319	27.58
	Post	25.85 (7.01)	10.98	42.716			
Balance	Pre	23.00 (7.79)	7.65	38.35	32.10 (8.41)	13.07	51.13
	Post	55.10 (10.07)	32.36	77.89			

Table 1: Mean, standard error and 95% confidence intervals, Mean difference, standard error and 95% confidence intervals of the difference for the 3 subscales of the MABC-2 pre and post intervention.

The MANOVA revealed a significant effect of time on the combined MABC-2 scores overall $f(3,7)=7.44$, $p=.014$ ($sig \leq .05$).This was a large effect size ($\eta^2=.76$).

Follow up Univariate analyses of the three subscales were therefore conducted. The mean manual dexterity score was higher post-intervention (M=15, SE=4.75) than pre-intervention

(M=4.15, SE=1.02) and this was significant. $f(1,9)=6.1$, $p=0.036$ (sig.≤.05). This was a small effect size ($\eta^2=0.4$). The mean difference pre-intervention to post-intervention was an increase of 10.85 (SE=4.39). The 95% confidence intervals of the difference estimates that we may observe an increase of between 20.79 and 0.91 in the population.

The mean aiming and catching score was higher post-intervention (M=26.85, SE=7.01) than pre-intervention (M=11.4, SE=3.78), and this was found to be significant $f(1,9)=8.3$, $p=.018$ (sig≤.05). This is a small to medium effect size ($\eta^2=0.48$). The mean difference pre-intervention to post-intervention was an increase of 15.45 (SE=5.36). The 95% confidence intervals of the difference estimates that we may observe an increase of between 27.58 and 3.319 in the population.

The mean balance score was higher post-intervention (M=55.1, SE=10.07) than pre-intervention (M=23, SE=6.79) and this was found to be significant, $f(1,9)=14.565$, $p=.0004$ (sig≤.01). This was a medium effect size ($\eta^2=0.62$). The mean difference pre-intervention to post-intervention was an increase of 32.10 (SE=8.41). The 95% confidence intervals of the difference estimates that we may observe an increase of between 51.13 and 13.07 in the population.

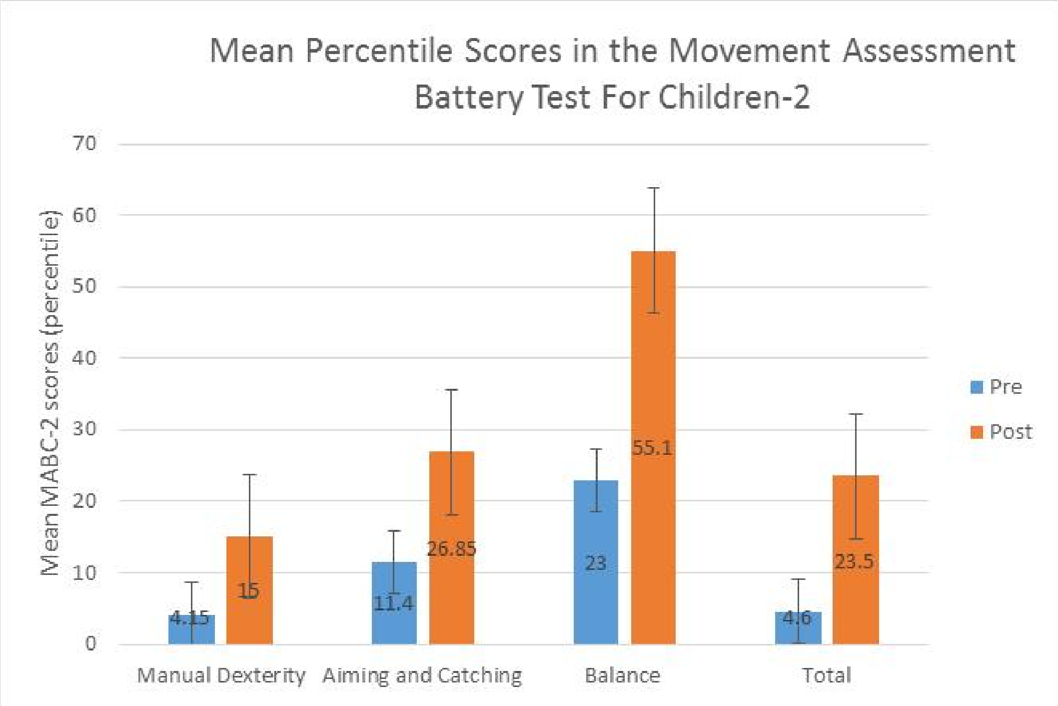

Figure 1: Graph showing mean centile scores in the MABC-2 pre and post intervention with standard error bars.

4.2. Traffic-Light System

The MABC-2 manual utilises a ‘Traffic Light’ system to explain a child’s total test score in terms of categories of difficulty. Red means at or below 5th percentile which denotes a significant movement difficulty, amber means between the 5th and 15th percentile and suggests the child is ‘at risk’ of having a movement difficulty, green means above the 15th percentile denoting no detected movement difficulty. The mean total percentile score showed that the pre-intervention total was in the red zone (Mean=4.6 ≤ 5th percentile). The mean post total percentile score showed that the post-intervention total was in the green zone (Mean=23.5 ≥ 15th percentile).

Looking individually at the total percentile score for each child, table 2 demonstrates how many children moved between categories on their movement difficulties. It was found that 3 children remained in the red category, 1 child moved up one category from red to amber, 4 children moved up 2 categories from red to green and 1 child moved up one category from amber to green. This means that 6 children, post-intervention, were now in the category classed as no longer having a movement difficulty.

Participant	Pre-Intervention centile	Post-Intervention centile
1	1	5
2	9	63
3	0.5	5
4	5	16
5	2	9
6	0.5	1
7	9	37
8	5	37
9	9	25
10	5	37

Table 2: Pre and post intervention centile category for each participant in the MABC-2.

4.3. Social Interaction

A 2-by-3 mixed ANOVA was conducted using the total SSQ scores between time (pre-and post-intervention) and respondent (parent, pupil, teacher).

The results showed that the teacher scores were higher than the parents' and children's scores with a trend towards significance for respondent, $F(2,18)=3.07$, p=.07.This is a small effect size (η^2 =.25).

The ANOVA showed no main effect of time f(1,9)=2.82, p=.127 (non sig≥.05). The effect size was small (η^2=.24).This shows that there was no change in social interaction after the intervention. The mean difference across respondents between pre-intervention to post-intervention was a decrease of 2.63 (SE=1.57). The 95% confidence intervals of the difference estimates that we may observe change of between -6.18 and 0.91 in the population. As this estimate crosses zero we cannot conclude that we would observe any change in the population.

The ANOVA showed that there was no significant interaction between respondent and time over SSQ scores $f(2,18)=.31$, $p=.74$ (non sig≥.05). This is a very small effect size ($\eta^2=.03$).

SSQ				
			95% confidence interval	
		Mean (SE)	Lower	Upper
Pupil	Pre	46.30 (1.51)	42.89	49.71
	Post	43.00 (2.22)	37.99	48.01
Teacher	Pre	38.20 (3.84)	29.51	46.90
	Post	34.60 (3.89)	25.78	43.42
Parent	Pre	42.90 (2.63)	36.96	48.84
	Post	41.90 (3.59)	33.78	50.02

Table 3: mean and standard error scores with 95% confidence intervals, pre- and post-intervention across pupil, teacher and parent responses to the SSQ.

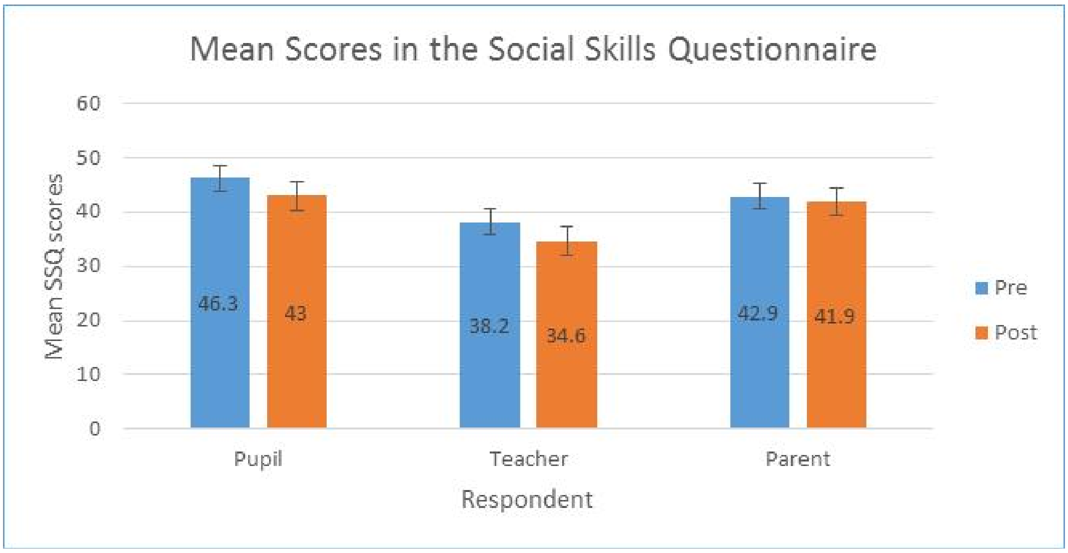

Figure 2: Graph showing mean scores pre and post intervention for pupil, teacher and parent in the SSQ with standard error bars.

4.4. Self-Esteem

A mixed MANOVA was conducted between time (pre-intervention and post-intervention) and respondent (parent or pupil) on all 5 subscales of the Self-Perception Profile (SPP) (scholastic competence, social acceptance, athletic competence, physical appearance, behavioural conduct). Several variables were skewed; however, MANOVA was used due to robustness(GLASS et al., 1972).

SPP							
			95% confidence interval			95% confidence interval	
		Mean (SE)	Lower	Upper	Mean Difference (SE)	Lower	Upper
Parents							
Scholastic Competence	**Pre**	2.63 (0.35)	1.84	3.42	0.11	0.21	0.01
	Post	2.74 (0.31)	2.05	3.43			
Social acceptance	**Pre**	2.08 (0.21)	1.61	2.55	0.23	0.27	0.19
	Post	2.31 (0.19)	1.88	2.74			
Athletic Competence	**Pre**	1.64 (0.21)	1.18	2.10	0.04	-0.06	0.14
	Post	1.68 (0.25)	1.12	2.24			
Physical Appearance	**Pre**	3.88 (0.06)	3.74	4.02	-0.02	-0.11	0.07
	Post	3.86 (0.33)	3.63	4.09			
Behavioural Conduct	**Pre**	2.9 (0.18)	2.49	3.31	-0.10	-0.46	0.26
	Post	2.8 (0.34)	2.03	3.57			
Pupils							
Scholastic Competence	**Pre**	2.33 (0.2)	1.87	2.79	0.27	0.23	0.31
	Post	2.6 (0.22)	2.10	3.10			
Social Acceptance	**Pre**	2.71 (0.17)	2.33	3.09	0.04	-0.16	0.24
	Post	2.75 (0.26)	2.17	3.33			
Athletic Competence	**Pre**	2.16 (0.24)	1.62	2.70	3.50	0.58	0.42
	Post	5.66 (0.65)	2.20	3.12			
Physical Appearance	**Pre**	2.88 (0.14)	2.56	3.21	0.30	0.12	0.47
	Post	3.18 (0.22)	2.68	3.68			
Behavioural Conduct	**Pre**	2.68 (0.21)	2.21	3.15	0.13	0.10	0.16
	Post	2.81 (0.22)	2.31	3.31			

Table 4: Mean, standard error and confidence intervals, mean difference, standard error and 95% confidence intervals of the difference of the five subscales of the SPP pre and post intervention for pupils and parents.

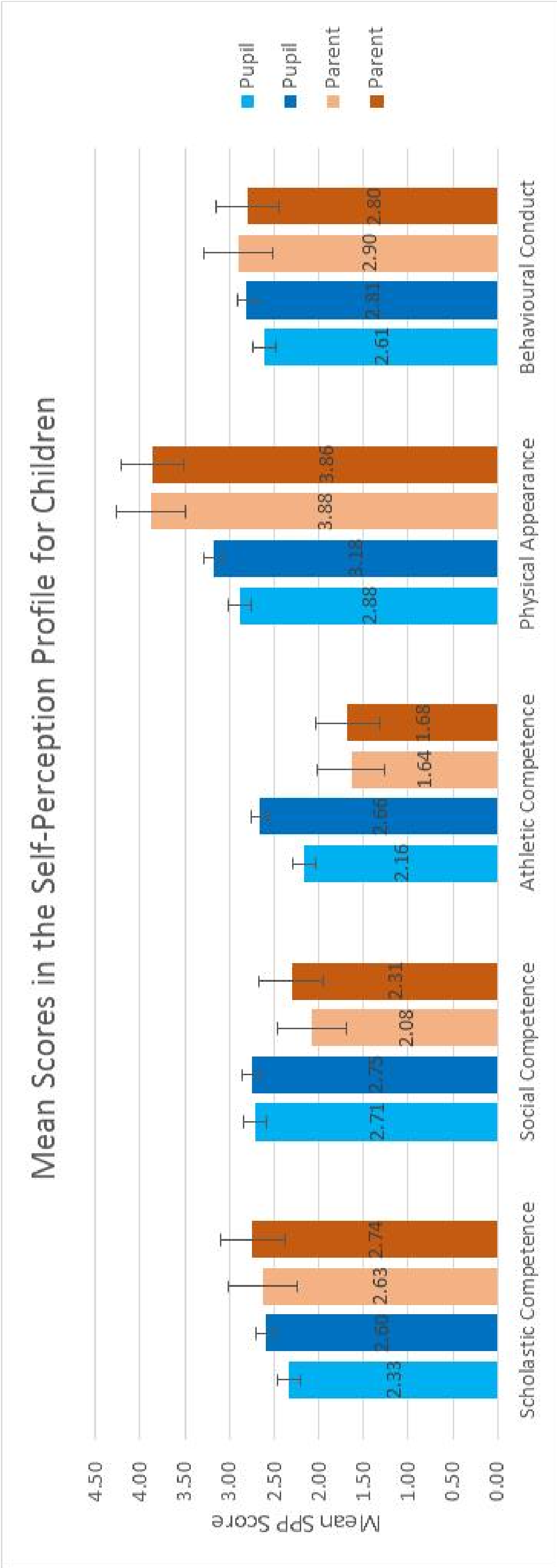

Figure 3: Graph showing mean scores for the SPP, pupil and parent pre and post intervention with standard error bars.

The MANOVA shows there was no significant effect of time on the mean combined SPP scores overall $f(5,5)=2.45$, $p=.17$ (non sig $p \geq .05$) which suggests there was no change in self-esteem following the intervention. However, there was a medium-to-large effect size ($\eta^2=.71$) which might reflect an effect that did not reach significant levels due to small participant numbers.

The mean difference scores on each subscale and 95% confidence intervals suggest that for:

Scholastic competence: The mean difference pre-intervention to post-intervention was an increase of 0.11. The 95% confidence intervals of the difference estimates that we may observe an increase of between 0.21 and 0.01 in the population.

Social acceptance: The mean difference pre-intervention to post-intervention was an increase of 0.23. The 95% confidence intervals of the difference estimates that we may observe an increase of between 0.27 and 0.19 in the population.

Athletic competence: The mean difference pre-intervention to post-intervention was an increase of 0.04. The 95% confidence intervals of the difference estimates that we may observe an increase of between -0.06 and 0.14 in the population. As this estimate crosses zero we cannot conclude that we would observe any change in the population.

Physical appearance: The mean difference pre-intervention to post-intervention was an increase of -0.02. The 95% confidence intervals of the difference estimates that we may observe an increase of between -0.11 and 0.07 in the population. As this estimate crosses zero we cannot conclude that we would observe any change in the population.

Behavioural conduct: The mean difference pre-intervention to post-intervention was an increase of -0.10. The 95% confidence intervals of the difference estimates that we may observe an increase of between -0.46 and 0.26 in the population. As this estimate crosses zero we cannot conclude that we would observe any change in the population.

The MANOVA shows, using Pillai's trace, that there was a significant main effect of respondent on the mean combined SPP scores overall $f(5,5)=6.92$, $p=.027$ (sig. $p\leq.05$). This is a large effect size ($\eta^2=.8$). Specifically, there was a significant effect of respondent on the athletic competence subscale ($f(1,9)=24.3$, $p=.001$(sig $p\leq.01$)) with parents rating higher ($M=3.87$, $SE=.06$) than pupils ($M=3.03$, $SE=1.4$) on physical appearance, and pupils rating higher ($M=2.4$, $SE=.19$) than parents ($M=1.66$, $SE=.22$) on athletic competence.

There was no significant interaction between time and respondent $f(5,5)=2.64$, $p=.15$ (non sig $\geq .05$). This is a large effect size ($\eta^2=.73$).

As the Global Self-Worth scale is only available on the Pupil version of the SSQ, a paired samples t-test was conducted pre- and post-intervention. The mean Global self-worth score as rated by only the pupils themselves was higher post-intervention ($M=3.08$, $SE=.20$) than the pre-intervention ($M=2.75$, $SE=.22$). This was not significant $t(9)=-1.63, p=.14$ (non sig$\geq .05$). The mean difference between pre-intervention to post-intervention was an increase of 0.33. The 95% confidence intervals of the difference estimates that we may observe change of between -0.79 and 0.13 in the population. As this estimate crosses zero we cannot conclude that we would observe any change in the population.

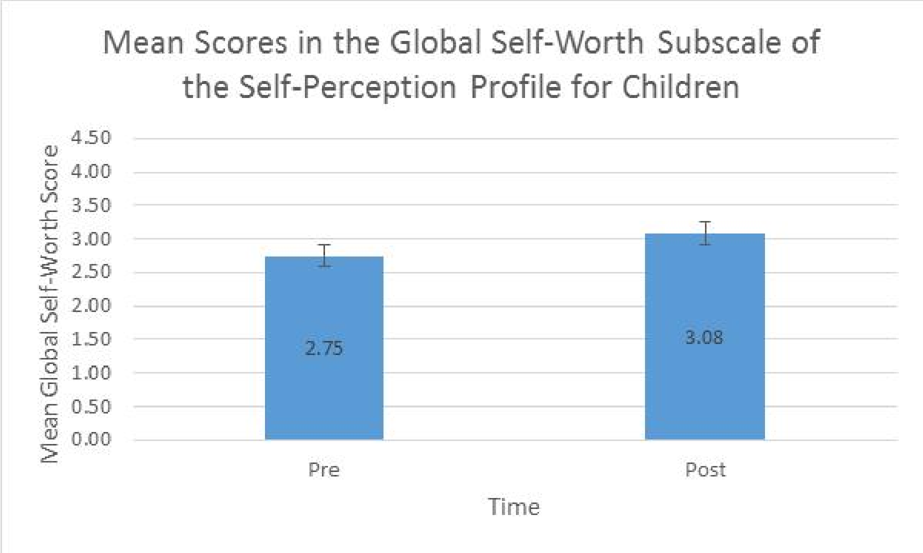

Figure 4: Graph showing mean scores in the Global Self-worth Subscale of the SPP pre and post intervention with standard error bars.

Global Self Worth				
			95% confidence interval	
	Mean (SE)	**Mean Difference**	**Lower**	**Upper**
Pre	**2.75 (0.22)**	0.33	-0.79	0.13
Post	**3.08 (0.21)**			

Table 5: Mean, standard error, mean difference and 95% confidence interval of the difference for the Global Self-Worth subscale of the SPP pre and post intervention.

4.5. Motor Skills Function

A MANOVA was conducted on the 3 subscales of the DCD (control movement, handwriting, co-ordination) over time (pre intervention and post intervention).

DCDQ							
			95% confidence interval			95% confidence interval	
		Mean (SE)	Lower	Upper	Mean Difference (SE)	Lower	Upper
Control Movement	Pre	15.50 (0.87)	13.53	17.47	4.00 (1.22)	1.24	7.76
	Post	19.5 (1.19)	16.80	22.20			
Co-ordination	Pre	11.2 (0.73)	9.56	12.85	1.50 (1.30)	-1.45	4.45
	Post	12.7 (1.22)	9.34	15.46			
Handwriting	Pre	10.3 (1.07)	7.87	12.73	0.40 (0.91)	-1.66	2.46
	Post	10.7 (0.76)	8.98	12.42			

Table 6: Mean, standard error and 95% confidence intervals, Mean difference, standard error and 95% confidence intervals of the difference for the 3 subscales of the DCDQ pre and post intervention.

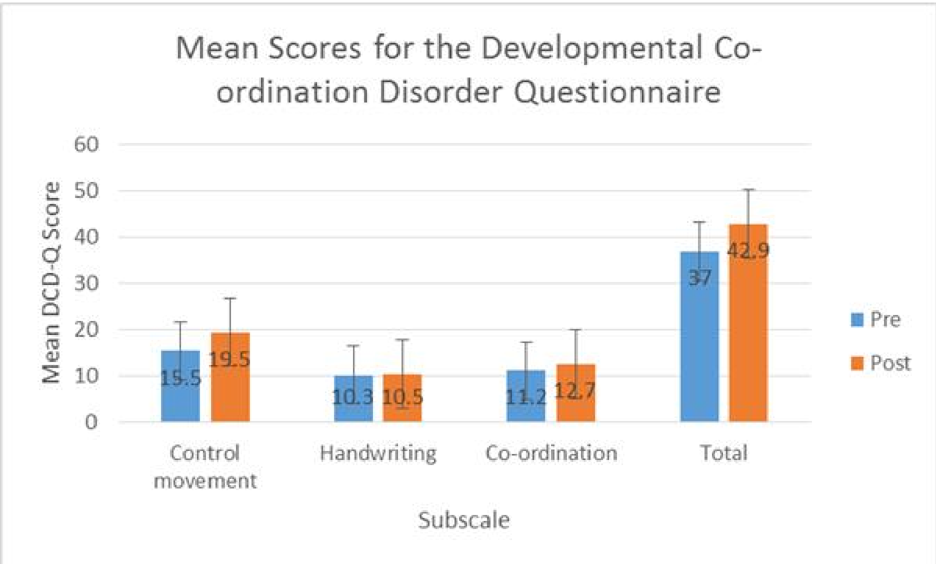

Figure 5: Graph showing the mean scores pre and post intervention for the DCDQ with standard error bars.

The multivariate MANOVA shows, using Pillai's trace, that there was no significant main effect of time on the subscales of the DCD-Q $f(3,7)=3.33$, $p=.08$ (non sig $\geq .05$). This result suggests a strong trend towards significance with an increase in scores following the intervention. This was a medium effect size ($\eta^2=.59$). Both the pre and post mean total scores are well within the indication of DCD range according to the manual.

Tests of univariate effects were explored due to the presence of a strong trend and show that the mean control movement score was higher post intervention ($M=19.5$, $SE=1.19$) than pre intervention ($M=15.5$, SE .872) and was found to be significant $f(1, 9)=10.75$, $p=.01$ (sig. $p\leq.01$). This was a medium effect size ($\eta^2=.54$). The mean difference pre-intervention to post-intervention was an increase of 4.00 ($SE=1.22$). The 95% confidence intervals of the difference estimates that we may observe an increase of between 1.24 and 7.76 in the population.

There was no difference in coordination scores pre and post intervention $f(1,9)=1.33$, $p=.28$ (non sig $\geq .05$). This is a small effect size ($\eta 2=.13$). The mean difference between pre-intervention to post-intervention was an increase of 1.50 ($SE=1.30$). The 95% confidence intervals of the difference estimates that we may observe change of between -1.45 and 4.45 in the population. As this estimate crosses zero we cannot conclude that we would observe any change in the population.

There was no difference in handwriting score pre and post intervention $f(1,9)=.19$, $p=.67$ (non sig $\geq .05$).This was a very small effect size ($\eta^2=0.02$). The mean difference between pre-intervention to post-intervention was an increase of 0.40 ($SE=0.91$). The 95% confidence intervals of the difference estimates that we may observe change of between -1.66 and 2.46 in the population. As this estimate crosses zero we cannot conclude that we would observe any change in the population.

4.6. Behaviour

A mixed ANOVA was conducted between Time (pre and post) and respondent (teacher or parent) on the total of the difficulty scales of the SDQ.

The variable parent-post was negatively skewed (KS(10)=.27,p=.039). Glass et al (GLASS et al., 1972) state that f is suitable in cases of skew, kurtosis and non-normality for two-tailed tests when group sizes are equal, thus the mixed ANOVA is robust in this case.

SDQ							
			95% confidence interval			**95% confidence interval**	
		Mean (SE)	**Lower**	**Upper**	**Mean Difference**	**Lower**	**Upper**
Teacher	**Pre**	**14.80 (1.78)**	10.79	18.82	-0.50	0.14	-1.15
	Post	**14.30 (1.49)**	10.93	17.67			
Parent	**Pre**	**17.90 (1.67)**	14.12	21.68	-1.60	-0.70	-2.50
	Post	**16.30 (1.27)**	13.42	19.18			

Table 7: Mean, standard error scores, mean difference and confidence intervals for the difference scores for the teacher and parent versions of the SDQ pre and post intervention.

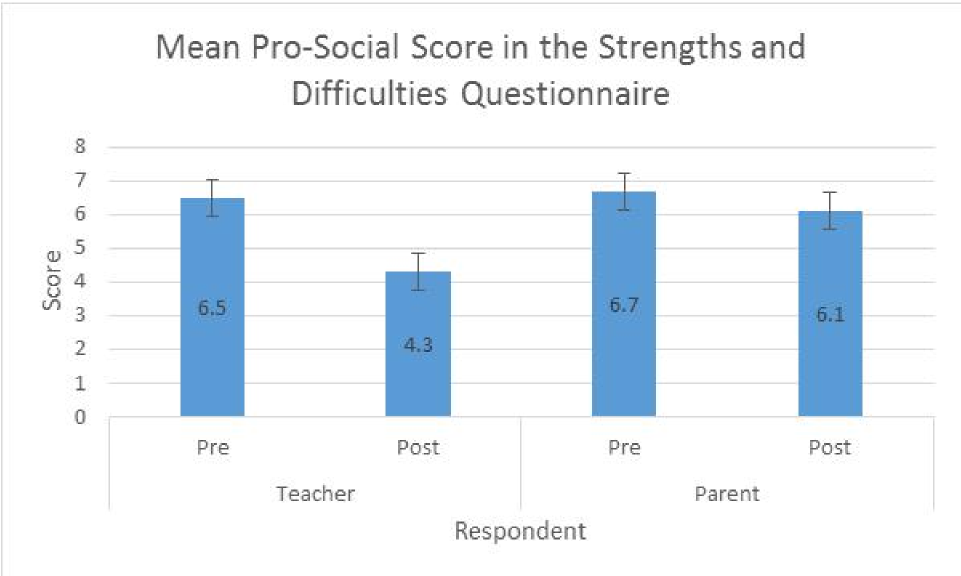

Figure 6: Graph showing mean total difficulty scores in the SDQ teacher and parent pre and post intervention with standard error bars.

The ANOVA shows that there was no significant main effect of respondent on Total SDQ score. f(1,9) =2.085, p=.709 (non sig ≥ .05). η^2=0.016; this is a very small effect size and suggests no difference in reported behaviour between teachers and parents.

The ANOVA shows that there was no significant main effect of time on total SDQ score, $f(1,9)=.48$, $p=00057$(non sig $\geq .05$).$\eta^2= 0.05$; this is a very small effect size and suggests no difference in behaviour following the intervention.

The mean differences and confidence intervals reveal that for the teachers the mean difference pre-intervention to post-intervention was a decrease of 0.50. The 95% confidence intervals of the difference estimates that we may observe an change of between 0.14 and -1.15 in the population. As this estimate crosses zero we cannot conclude that we would observe any change in the population. Whilst for the parents, the mean difference pre-intervention to post-intervention was a decrease of -1.60. The 95% confidence intervals of the difference estimates that we may observe an change of between 0.70 and 2.50 in the population.

The ANOVA shows that there was no significant interaction between time and respondent on the total SDQ scores. $f(1,9)=.148$, $p=0.709$ (non sig $\geq .05$), $\eta^2= 0.05$. This is a very small effect size.

A separate mixed ANOVA was conducted between respondents (teacher or parent) and time (pre and post) on the SDQ pro-social subscale as the manual states that this scale cannot be combined with the other SDQ scales to create a meaningful total. All of the variables met assumptions of normality.

SDQ pro-social subscale				
Intervention	**Teacher**		**Parent**	
	Mean	**SD (SE)**	**Mean**	**SD (SE)**
Pre	6.5	2.84 (0.89)	6.7	3.13 (0.86)
Post	4.3	2.71 (0.99)	6.1	3.67 (1.16)

Table 8: Mean, standard deviation and standard error scores for the teacher and parent versions of the pro-social subscale of the SDQ pre and post intervention.

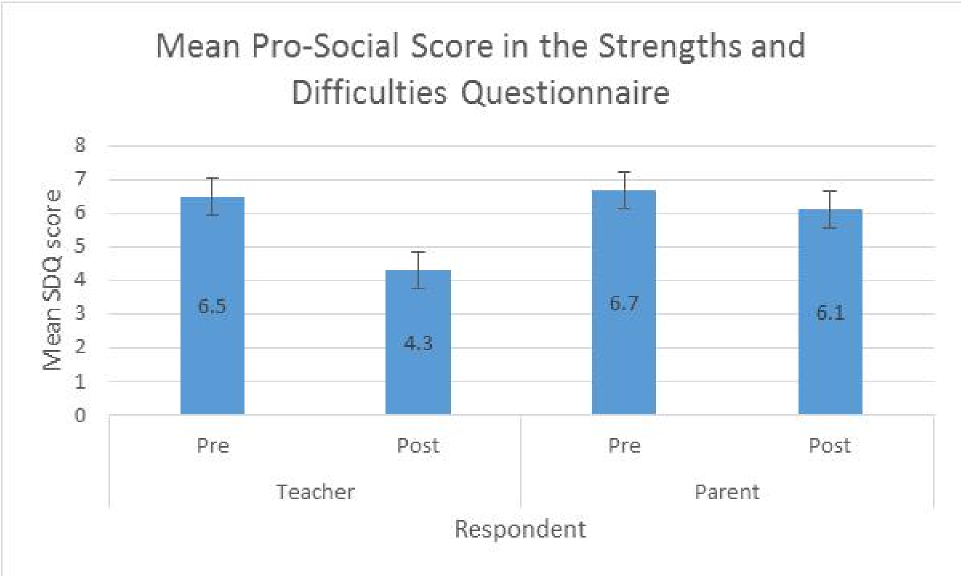

Figure 7: Mean pro-social scores of the SDQ teacher and parent versions pre and post intervention with standard error bars.

The mixed ANOVA shows that the difference was non-significant (f(1,9)=1.29, p=.285 (non- significant ≥ .05)) and the effect size (η^2=.126) was small.

The ANOVA shows that this difference was non-significant f(1,9)=3.15, p=.109 (non sig ≥.05)) and the effect size was small (η^2=.260).

The ANOVA shows that there was a significant interaction between respondent and time on prosocial SDQ score stats. The teachers noted a larger reduction in pro-social score than the parents. A post-hoc paired-samples T-test was conducted to examine the difference between the Teacher scores only, following this interaction. The mean pro-social score was higher pre-intervention ($M= 6.5$, $SD=2.84$) than post-intervention ($M=2.75$, $SE=.22$).This was significant; $t(9)=2.75, p=.022$ ($sig \leq .05$).

A post-hoc mixed ANOVA was conducted between time (pre and post) and location (clinic or school) on the teacher responses of the pro-social scale of the SDQ to examine whether being removed from lessons had a mediating effect on the decrease in prosocial skills. 4 children were treated at school with mean prosocial scores of 7.75 (sd=2.06) pre-intervention and 6 (sd=3.27) post-intervention. 6 were treated in the clinic with mean prosocial scores of 5.67 (sd=3.14) pre-intervention and 3.17 (sd=1.72) post-intervention.

When examining multivariate tests, the ANOVA shows that there was no significant effect of location on pro-social SDQ score $f(1,8)=2.87$, $p=.129$ (non sig $\geq .05$). $\eta^2=0.264$; this is a small effect size.

4.7. ASD Screening

The Social Communication Questionnaire returned a mean score of 13.6 ($SD=4.79$). A score of 15 or above is highly suggestive of traits consistent with an Autism Spectrum Disorder. 3 children scored above this threshold. The data gathered from all measures was compared visually to investigate whether there was an impact of ASD on change scores, i.e. were the 3 participants who scored above 15 also the participants who showed the least change in the MABC-2. This was not found to be the case and there was no link suggested between comorbid ASD and change following the intervention.

4.8. Qualitative Feedback

An array of unsolicited anecdotal qualitative information was collected through verbal and written feedback (see Appendix 28).

5. Discussion

The specific aim of this study was to evaluate the effectiveness of a non-invasive intervention, Fascia Bowen therapy, both at a physical and psychological level, when given to boys aged 8-11 (at primary school). Each of the boys who participated in the study had a diagnosis of dyspraxia/DCD which was a pre-requisite to allow them to join the study. Additionally, they had to be in the 15th centile or below in their motor function to allow them to be eligible to participate. From the results it was confirmed that the Fascia Bowen therapy, which was administered by qualified practitioners over a 6 week period, had proved to be an effective treatment for boys with DCD in their neuromuscular function as measured by an objective OT administered measure. In this area of function the boys improved significantly with only 3 of the 10 children remaining, in their pre-intervention 5th centile of motor coordination difficulties. No changes were reported in the boys for self/parent/teacher rated motor skills function, scholastic function (i.e. including attention, concentration span, handwriting and work completion rate), social interaction, self-esteem and behaviour after receiving the therapy. Additionally, no links were found between comorbid ASD (as measured by the SCQ) and change following intervention. As well as the study’s findings, methodological and procedural considerations are explored below and the clinical implications of the research are considered.

5.1. Neuromuscular Function

Significant improvement on the mean MABC-2 scores were demonstrated from before to after the intervention sessions. In terms of specific subscales of the MABC-2, the children's scores for manual dexterity improved over the time the Fascia Bowen was administered, demonstrating a small effect size. Aiming and catching scores also showed improvement from before to after the therapy, and these were shown to have a small to medium effect size. The balance scores also showed considerable improvement from before to after the Fascia Bowen treatment. For this subscale a medium effect size was demonstrated. Each of these subscales, when combined together to create a total score, showed a large effect size.

It was found that, following the intervention, there was an average improvement of 15.45 centiles in aiming and catching (95% confidence intervals between 3.319 and 27.58), 10.85 centile improvement in manual dexterity (95% CI between 0.91 and 20.79) and an improvement of 32.1 centiles in balance (95% CI between 13.07 and 51.13). This represents a total average improvement of 18.9 centiles. This is significantly important from a clinical perspective because of what it represents regarding the MABC-2 traffic light centile classification related to the levels of movement difficulties. An improvement of 5 centiles represents a child potentially moving from the worst category, where significant movement difficulties are present, to being in the at risk of having movement difficulties category. This result is clinically relevant in terms of the literature but also the implications for the patients and families are potentially profound.

In one study (Wuang et al., 2012) a physiotherapy intervention was investigated. The results showed MABC-2 centile scores improving by 1.4 in aiming and catching, 1.5 in manual dexterity and 1.1 in balance, representing a total of 1.3. No confidence intervals were reported in this paper. Another study (Niemeijer et al., 2007) conducted a neuromotor task training intervention and found an improvement of 5.9 centiles overall with a 95% confidence interval of 0.94 to 16.1. A third study (Tsai, 2009) conducted an exercise intervention which found a total improvement of approximately 3 centiles. No exact score or 95% confidence interval was reported. All three papers' results indicate positive improvements in total centile scores, however none exhibit such a large improvement in MABC-2 scores as highlighted in the results presented in this thesis.

The present results involving medium to large effect sizes were surprising, as the literature does not demonstrate that bottom-up interventions generally show strong effect sizes (Novak, 2013, Smits-Engelsman et al., 2013). Fascia Bowen is an example of a bottom-up intervention as it aims to improve underlying processes in order to effect functional change. The improvements seen in neuromuscular functioning and the effect sizes in the present research were therefore unexpected findings when compared to the existing research literature, and show the efficacy of Fascia Bowen therapy for improving the movement difficulties found in children with DCD. To date, large effect sizes have only been reported in studies using top-down interventions following an evaluation of a larger number of studies using sound methodologies (Smits-Engelsman et al., 2013). The present research therefore provides an important addition to the existing literature evaluating bottom-up interventions in that it reports significant effects on improving muscular functioning with medium to large effect sizes.

Of the 10 children who participated in the study 7 showed improvement in MABC-2 measures of neuromuscular functioning. Six of these children no longer fell into the category of having a movement difficulty according to the MABC-2, having received the Fascia Bowen intervention. However, three of the children still remained in their pre-intervention assessment centile but even these showed improvement within their pre- intervention centile category. Another child showed improvement that resulted in being labelled only in the “at risk” category of movement difficulty after the intervention.

These results show that the Fascia Bowen intervention produced an overall significant improvement in the children’s neuromuscular functioning, such that after the intervention most of the boys were no longer classified as having DCD as measured by the MABC-2 “traffic light” which measures movement difficulty. This is significantly important because for individuals whose manual dexterity, aiming and catching and balance improved, dropping objects potentially becomes less of an issue, and clumsiness in the form of falling over and colliding with obstacles could also reduce. Improvements in aiming and catching permits the child to participate in games involving ball skills. It is important to re-acknowledge that, from the literature review, it was suggested that the self-esteem of males in Western Society is driven by their self-perceived athletic competence (Piek et al., 2006). Over time, deeply-rooted constructs such as self-perceived competence could potentially improve if their actual competence with dexterity, catching and balance improvements were sustained.

The significant improvement in neuromuscular function is additionally important because this was a novel piece of research testing a therapy never before tested under scientific conditions. It also confirms the anecdotal evidence of improvements from UK-based Fascia Bowen clinics delivering Fascia Bowen to children with dyspraxia/DCD for almost 30 years of practice.

5.2. Alternative Explanations

The neuromuscular function of the participants improved significantly from before to after the intervention; however, it is important to consider the possibility of confounding variables impacting the results of the study and the lack of significant improvements demonstrated in the behavioural and psychological domains which did not improve significantly. Confounding variables could have been practice effects and improvements over time. There are also methodological considerations, such as the lack of control group, which would be addressed in a further study.

5.2.1. Time

It is possible the children might have shown improvements in muscular functioning based on natural development improvements; however, given the relatively short intervention period of six weeks, it is unlikely the participants would have demonstrated such improvement in their neuromuscular function within such a short space of time without the intervention. The present results showed that fascia Bowen therapy was related to improvements in neuromuscular functioning that were clinically meaningful.

5.3. Other Measures

5.3.1. Motor Skills Function

There was no significant change found in parent reports of Motor Skills Function as measured by the DCD-Q, however because the result reached almost significant levels further tests were conducted. The subsequent results showed that the Control Movement subscale improved significantly over the time of the intervention. The total DCD-Q mean difference from pre to post intervention was 5.9 which is not significant, however, the three subscales were reviewed due to the strong trend observed and the results showed that the control movement subscale category was found to be significant with a mean difference improvement of 4.0 from pre to post intervention (CI between 1.24 and 7.76). The other two subscales within the DCD-Q did not reach significance. The total post DCD-Q result was 42.9. However, eligibility for a classification of 'outside the risk' range of difficulty requires a score equal to or greater than 65 out of 75. The score achieved therefore was a significant score but with a relatively small clinical significance.

A search of available literature indicated that most studies were using the DCD-Q measure only as a screening tool before conducting the intervention. However, one paper (Ashkenazi et al., 2013) uses it within a pre and post intervention study, found an improvement in control movement across both of the interventions conducted, namely the virtual reality programme and the conventional OT intervention from pre to post. In the same study the total mean difference of the DCD-Q was 5.6 centiles with the control movement subscale mean difference recorded as 7.5 centiles from pre to post.

In the virtual reality programme intervention alone the total mean difference was 2.5 centiles with a control movement mean difference of 4.8 centiles. In the other subscales no significant changes were demonstrated. In the conventional OT intervention, the total mean difference was 8.8 centiles with a control movement mean difference of 10 centiles. Again, no significant result was achieved in the other subscales within the OT intervention. The overall mean result reported in the paper was sufficient, due to the significant change in the control movement subscale, to bring the overall total to significant levels. While reviewing the study's results it was noted that because the data was reported in centiles it was difficult to directly compare them with the results demonstrated in this thesis without having access to the published DCD-Q centile conversion tables. Despite this difficulty however, it is interesting to note that both the study discussed above, together with the results presented in this thesis, showed a similar pattern of results i.e. small increases in the overall DCD-Q, and significant improvement in the control movement subscale only. This subscale incorporates ball throwing, ball catching, hitting a ball, jumping over something, running and planning activity. Additionally, it is interesting to note that the significant result demonstrated in the neuromuscular function using the MABC-2 measure, incorporated similar tasks, namely aiming and catching, manual dexterity and balance. So, if these functions were demonstrated to have improved in both the DCD-Q and the MABC-2 this could indicate that the mechanisms involved in these functional improvements occurred as a result of the Fascia Bowen intervention which would indicate the need for further investigation incorporating a larger sample plus a control group to minimise potential confounding variables which could be influencing the results e.g. placebo effects.

Gentile (Gentile, 1992) states that skill acquisition is a product of the child's functioning and the environment. If improving skills is the objective then a skill-based intervention should be utilised i.e. using top-down approaches rather than by targeting the underlying processes using methods such as bottom-up interventions. Mandich (Mandich et al., 2001a), conducted a comprehensive review and stated that robust studies show that the empirical evidence does not support bottom-up interventions in improving functional skills. This could be one reason for the lack of significant results in other components of functioning in the study participants and that, in line with much research, bottom-up approaches do not tend to affect change in functioning. However, this study was small, there were no controls and the intervention period could have been too short to expect to see evidence of functional changes occurring. Kirby suggests that any study utilising bottom-up approaches should make special considerations for this lag and conduct re-assessment 8-10 weeks following the cessation of the intervention, e.g. such as using the DCD-Q. This could potentially demonstrate that functional improvements may have had more time to become established. If this study were repeated, then these questions would need to be addressed to ensure that any future study included controls in the first instance, that the intervention period was lengthened and that it included additional follow-up assessments.

It is also interesting to consider that gains in underlying neuromuscular function may be more generalizable than when only one isolated skill is learnt (Kirby, 2009). If this were the case then consideration should also be given to incorporating a combined approach using top-down and bottom-up approaches to ensure improvements in both acquired skill, and more generalizable improvements in underlying function. However, in research terms it may make it impossible to state what was responsible for any change; therefore further studies could be conducted using 3-arm methodology to compare top-down, bottom-up and combined interventions.

5.3.2. Scholastic Function

Scholastic function was measured using a 5 point Likert scale which was designed by the researcher. This was done as no pre-existing measure could be identified that seemed appropriate for the intended use within the present research. The measure showed no significant change over time, suggesting that the Fascia Bowen therapy did not lead to improvements in scholastic function over a 6 week period of intervention. This result was surprising in that it did not reflect the practitioner’s experience in practice over a number of years treating children diagnosed with DCD. It was considered therefore that the lack of improvement could have emerged for a number of reasons, namely that the intervention period was too brief, or the measure was not sufficiently sensitive to changes in each domain of measurement. It could also have been because the teacher reporting was not consistent because different teachers had reported pre and post intervention as evidenced by the different signatories appearing on the measures. Of course, this could be considered advantageous because the teachers were not blind to the intervention. The interpretation of change by the teachers may have been subjective, thereby introducing bias i.e. there were hand-written notes and email correspondence regarding observed changes in participants which disagreed with the measure data (see Appendices 24-27). Considerations for future research could be that written instructions should be provided to the head teacher pre-intervention instructing about the importance of maintaining class teacher reporting consistency. Another future research change would be to use a different measure, one reliant on less subjective feedback if such a measure could be located.

5.3.3. Social Interaction

The children's social interaction was measured before and after they had received the Fascia Bowen therapy and this was done using the Social Skills Questionnaire (SSQ). The results showed no improvement in the children's social interaction from before to after the therapy across parent, child and teacher informants. All the pre and post scores were in the normal range based on the normative data of the SSQ manual (plus/minus 1 SD from the mean). This signified that the children who participated in the study did not appear to have existing problems with their social interaction. This does not agree with the findings from the literature review regarding children with DCD (Chen and Cohn, 2003, Sylvestre et al., 2013). There, the literature suggests that children with DCD are often isolated as a result of their inability to perform tasks efficiently, thus causing them to ‘stand out’ within their peer group, thereby lessening their social interaction abilities. These results could be because this sample may have been on the upper scale of the children with DCD in terms of social functioning. The aim of this study was to test whether the fascia Bowen therapy improved their social skills, but if the sample of 10 did not have noticeable social skills problems before they received the intervention then it would be quite understandable that an improvement would not be found. Other potential reasons for lack of change could have been due to the measure used not being sufficiently sensitive, or that the children and parents did not wish to report difficulties. In terms of the small sample size this could be addressed in any future research by having a larger sample size which may be more representative of the DCD population with regard to poor social functioning.

5.3.4. Self-esteem

Self-esteem was measured using the Self-Perception Profile (SPP), which showed that there was no significant change over time reported in the parent version or child version after the children had received the therapy. However, a trend towards significance and a large effect size was demonstrated, so this lack of significance may have been related to small sample numbers.

It is worth considering that self-confidence and self-esteem are defined as the perception of competence and self-worth: and it was expected that self-esteem and confidence would improve alongside improvements in motor functioning, which was not found. However, it is arguable that there would be a lag between change in functioning and change in *perception* of functioning. It would take time for such a deep-rooted construct to change, and the study only lasted a short term. This could be further explored with the comparison of the parent-report version of the SPP, which measures *actual competence* rather than self-*perception* of competence. This means that one can judge a child's self-perception relative to their actual competence; if parents state that they are not very competent at athletics and the children perceive they are not very competent at athletics then this could not be judged as a self-esteem issue: it is an accurate reflection of *actual* competence. One might expect a change in parent measure followed by a change in child measure, as self-perception catches up with the perceived changes by others. In the current study, no significant change was found in either measure. It is important to note here that regardless of the point expressed above, the reporting is still the parent's subjective view of their child's competence.

A search of the literature was conducted to identify studies involving children of the same age and gender in order to enable a comparison to be made. The pre-intervention self-esteem scores for the children in the present study (mean =2.75) were outside of the normal range (plus/minus 1SD from the mean) of those seen in previous research with children (mean = 3.41) (Skinner and Piek, 2001). However, the post intervention scores (mean = 3.08) indicated that the children in the present study had now moved into the normal range based on previous scores (plus or minus 1SD from the mean). This is a very small change and not statistically significant, so it could have occurred by chance. Additionally the one-to-one contact with the OT and FB practitioner could also have enhanced the self-esteem in view of the positive experience of that attention. Improvement in the children, though non-significant, was in line with the expectation of the present research where psychological measures were predicted to improve with improvements in muscular function. It is also consistent with anecdotal evidence gained in Fascia Bowen therapy practice, where parents and children often self-report about positive improvements in self-esteem. Indeed, in the present study there were positive reports from parents and teachers about improvements in the children seen after intervention. Parents had reported in emails to the researcher and verbally to head teachers that their children had demonstrated more confidence on a number of occasions; e.g. one noted that while shopping that the child had asked if he could go somewhere other than stay by his mother's side (this was totally un-characteristic).

While it is encouraging that the participants' scores changed into the normal range of descriptive scores (plus/minus 1SD from the mean), it is important to note the changes were not statistically significant. The lack of statistical significance may have been influenced by the low sample size, as there were medium to large effect sizes in the results. Further to this, anecdotal reports are encouraging, but are not reflected statistically in the quantitative data. It is possible that individual instances do not equate to significant change when averaged over all children and cross-contexts. Or, perhaps there was not enough time for the changes to reach significant levels. It is therefore important to consider, alongside participant and experimenter bias that again, small sample sizes and not enough time following intervention were given in the current study for anecdotal improvements to manifest in quantitative change. Problems of bias from anecdotal reports could also have been an issue. Any future study would need to include a control comparison and adequate blinding, with more rigorous methodology around gathering of qualitative information, to limit bias.

5.3.5. Behaviour

The behaviour of the children was measured using the Strengths and Difficulties Questionnaire (SDQ). The overall SDQ scores, including emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and pro-social behaviour did not change significantly from before to after intervention, showing that the Fascia Bowen intervention had no measurable impact on the participants in these areas of functioning over the study's intervention period. This also seems to verify what the literature review found i.e. that bottom-up approaches do not seem to be efficacious in effecting changes in DCD (Barnhart et al., 2003, European Academy of Childhood Disability, 2011).

The 5 subscales measured by the SDQ, the pro-social subscale score, as reported by the teachers only, showed a significant change from the normal range to borderline abnormal from pre to post intervention, suggesting that their social behaviour worsened from the teachers' perceptions. One possible explanation for this could be that the children having treatment in school were missing time with their peers. On further investigation of this possibility it was shown not to be the case as the results for those treated in school time were not different for those who were treated in the clinic out of school time, possibly indicating that the location of the therapy did not account for the decrease in social skills.

It must be considered that the Fascia Bowen caused a worsening in the social skills of the children. The change in social skills was very small and could have occurred by chance or because the children were more confident with the result that they became more challenging to their teachers. If the social skills worsened then this could be an ethical problem for the research or it could be considered that if neuromuscular function improves then social skills worsen.

On the pro-social scale of the SDQ the teachers noted a significant decrease in the pro-social skills of the children; the parents also noted a decrease but it was not found to be significant. On the SSQ all three, teacher, parent and pupil showed reports demonstrating a trend towards a significant decrease in general social skills. It is possible that taking part in a research trial contributed to the lack of significant effect in the measures for emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and pro-social behaviour. Alternatively, it could have been purely as a result of the participants being in research trial, lessons missed, meeting different people associated within the research. The way to deal with this would be to have a control group.

The observed effect size was small, which means that clinically it may not be significant, so another research would be necessary with a control group.

The SDQ scoring includes a normal category, meaning that the score is not clinically significant, a borderline abnormal category meaning that there may be clinically significant problems, and the abnormal category meaning there is a substantial risk of clinically significant problems. All the teacher mean scores were in the borderline category pre and post intervention. The parent mean scores were in the abnormal range pre intervention and then in the borderline range post intervention. So although the changes were not statistically significant, the parent reports show that the children's strengths and difficulties had improved from pre to post intervention even though the effect sizes were small. The previous literature highlights that children with DCD often find themselves unable to judge how to correctly behave in the company of others, leading to social difficulties. Both teacher and parent replies were in line with the literature, and showed that the intervention did not improve these social difficulties. However, the parents' descriptively-reported SDQ scores of the children changed from abnormal to the borderline category, suggesting that there might have been some positive improvements not captured by the statistics. However, this change was small and thus could have been the result of chance. These measures are also subject to participant bias, as parents may have been more likely to report positive change due to expectation bias and because they wanted to see change. Once again there were small effect sizes, suggesting that more participants would be required to test this with more efficacy.

5.3.6. Summary

The main objective in all types of intervention for children with DCD is not only to improve their motor skills, but to improve ability to function in their daily life. This study found improved neuromuscular function using an objective measure administered by an independent OT (MABC-2); and there were changes in one scale of the DCD-Q and a small, albeit negative impact, on the social skills according to the teacher measures of the SDQ. However, there was no change from before to after intervention in parent-reported motor skills function, scholastic function, social interaction, self-esteem or behaviour.

It was hypothesised that changes in neuromuscular functioning would, in turn, also affect other domains of functioning, however only the control movement subscale demonstrated any changes and no change was seen in the DCDQ overall when all subscales were combined. According to Kirby, we do not currently have sufficient empirical evidence to lend support that any form of SI (of which Fascia Bowen is an example) is effective as an intervention method (Kirby, 2009). She also states that, at best, it could be as effective as any other method in its ability to effect motor skill improvements. Kirby also states that the Mandich review lacks a functional approach (Mandich et al., 2001a) and that the theoretical basis of SI therapy, for example, is not supported by our current understanding about motor development learning and control. It is true that there is a shift taking place to the task-orientated approach of treating children with DCD, and this is the method which is supported by the literature at present. Kirby also suggests that if SI therapy is to be selected as a chosen intervention then its approach should be in the form of a trial using clear and measurable functional outcomes (Kirby, 2009). Alternatively, it is possible that incorporating combined approaches would be the most beneficial so that long-term improvements in the participants could be manifested. Using a combined approach will see the generalizability of the bottom-up approach together with the functional skills improvements of the top-down approaches.

5.4. Methodological Limitations

5.4.1. Control Group

Initially, it was considered that the present study was limited due to the absence of a recruited and included control group not receiving Fascia Bowen therapy. According to the MRC framework however a pre-post study is the ethical and appropriate design to commence research before progressing to one with a control group in order to test the theoretical treatment effect (MRC, 2000)The original design for this study had intended to incorporate a control group which would receive a sham treatment. Recruitment difficulties limited during the process limited the number of participants who were eventually recruited to a total which was insufficient to allow for a control group in addition to a group receiving the intervention. The inclusion of a control group would have directly addressed some of the possible alternative explanations of the results, such as practice effects or the placebo effects.

In view of the importance of having control data to enable comparisons to be made, the researcher has included control norm data from other studies, discussed in detail below, using similar age groups and gender, in order to highlight comparisons between normally developing children and those with DCD. This research has still shown very useful results and has provided a proof of concept study. The present results will inform future research, which will include a control group.

5.4.2. Inter-rater Reliability

Only one experienced OT assessed all the participants and this could have introduced bias in the form of improved results due to the familiarity of the participants with the OT and vice versa. Familiarity can also lead to improvements because the children become less nervous by the second assessment. The assessment, both pre and post intervention, was conducted by the same OT, and while she did not refer to the pre intervention scores when completing the post intervention assessment she was not blinded to the first set of scores and may have therefore have recalled them. The most desirable way of overcoming this would be to have different raters blinded to which assessment they were conducting and that to avoid inter-rater disagreements inter-rater reliability tests would be conducted during the study. This could be done by recruiting extra participants over and above the desired number so that a small pilot test group could be conducted to check accurate testing between raters.

5.4.3. Small Sample Size

One of the difficulties with having such a small sample group is the higher likelihood of false positives and negatives. If Fascia Bowen did cause change to occur and the effect size shown was small then the small sample size would mean that change would not be detected due to the lack of power. To address this, a larger sample size would be required to make a small effect size significant if a true effect exists in the population. An A priori power calculation in G*Power revealed that, based on a study using a repeated-measures MANOVA with an assumed small effect size (0.25) with 2 groups and 4 measures that to reach 80% power the total sample size would need to be 179 participants.

Future studies should recruit larger samples of children.

5.4.3.1. Recruitment Difficulties

The original objective of this study was to recruit enough male participants between the ages of 8 and 11 to conduct a small randomised controlled trial using up to 30 participants. It was hoped that the Fascia Bowen practitioners in their regional locations would assist in the participant recruitment process. However, once the difficulties of this process became evident most of the practitioners withdrew their involvement. The consequence of this was significant and resulted in the researcher being forced to abandon conducting a RCT. Another aspect which impacted upon the success of the recruitment process was that it was not clear whether the proposed 60 letters had been sent out to local schools by the individual charged with this task. These contained the important information sheets for parents (see Appendix 7). Following receipt of the information sheets the head teachers would be asked to gather the names of the parents with children having identified motor problems. The researcher would then forward the appropriate number of information sheets to the head teachers for onward transmission to parents. Unfortunately not one response was received via this route. Additionally, suitable organisations and groups for Dyspraxia members were contacted, e.g. dyslexia groups, autism and Asperger groups (because of co-morbidity of conditions); local authorities and independent OTs were also contacted but the response was negligible. Had they been able to generate parent interest, parent and child information sheets could have been forwarded to begin the process involved in permitting the eligible children to take part in a manual therapy intervention not administered in an NHS environment. There were other possible reasons for the failure to reach the target set for recruitment in the study; one was that the arrival of the letters reportedly coincided with Ofsted visits and therefore would have been a busy time for the school. The lack of NHS involvement in the study also proved to be detrimental to the recruiting process. Many schools had a policy in place that dictated that research involvement could only be conducted with NHS or local authority approval. It is important to note that consideration was given to applying to the NHS for ethical approval, but the researcher was informed that to obtain NHS ethical approval would have proved impossible because it would not consider a CAM intervention unless it had existing peer-reviewed literature demonstrating its efficacy. Another example of recruitment difficulty was from one local authority inclusion team who were approached as a potential source of participants. Unfortunately they currently operate under a policy where they do not become involved in research which utilises treatment which is not in the NICE guidelines (i.e. task-specific intervention).

One other difficulty encountered was that in many instances where potential participants for the study were identified by the researcher, it was found that while these children already had a diagnosis of DCD, they were already receiving an intervention or were involved in a school-based programme of teacher-led interventions. This involvement would have rendered them ineligible for this study due to its rigorous exclusion criteria. In one instance the staff of a private school with approximately 60 children diagnosed with DCD demonstrated interest in joining the study but again, it was not possible to recruit any of these children because of their ongoing involvement in other school-based OT administered interventions, which rendered them ineligible to join. Many of these had also been assessed very recently using the MABC-2 test so, even if a child was not yet enrolled onto an intervention programme, the potential practice effect from having yet another MABC-2 assessment to join the study so soon after the last one may have influenced the final results. For this research, and probably for studies of this kind in general, recruitment was clearly the most frustrating element of the research process.

Despite utilising rigorous attention to detail in all aspects of this study's design, ethics, and in the communication with all contacts, it was found that recruitment was very difficult, and only 11 potential participants were identified for assessment. One of these was found to be ineligible after undergoing his initial assessment as he was found to be above the 15th centile in his motor skills function. The study required a centile rating of 15th or below. However, 10 participants did take part and these remained in the study to the end so the study had no attrition rate. Initially the study was designed as a 2-armed RCT including both an intervention and control group. Due to the lack of participants recruited it was deemed impossible to fulfil the original design concept.

5.5. Potential Confounding Variables

Pearson Clinical does not recommend re-testing with the MABC-2 for 6-12 months due to possible practice effects (Pearson Education Limited, 2014b). Therefore, it must be a consideration that improvements in neuromuscular function could be attributed to practice effects. However no test re-test investigations were reported in the manual and thus this recommendation was made based on an estimate. In fact, following publication, at least two studies have indicated good test re-test reliability over shorter periods of time than the recommended 6-12 months. Wuang et al (2012) tested and re-tested after 21 days and found excellent test re-test reliability with an intraclass correlation coefficient of 0.97 (Wuang et al., 2012). Sugden and Chambers (2003) and another tested the participants 5 times in 40 weeks and found that there was no significant change in MABC-2 scores after 8 weeks when no intervention took place (Sugden and Chambers, 2003). This indicates that no improvement is made through repetition of the MABC-2 alone. Due to the lack of empirical support for the Pearson recommended 6-12 month re test period and the above mentioned studies which demonstrate that the measure is reliable over shorter periods of time it was felt that practice effects could be ruled out as a potential explanation for improvement.

It is important to include that the tests, both pre and post intervention, were conducted by the same OT who would have had knowledge of the initial scores as well as the children's involvement in therapy, and the lack of blinding in this aspect of the assessment process could be viewed as potentially impacting on the validity of the findings.

During the course of the study it was suggested that different variables which occurred may have impacted on the lack of significant improvement in self-esteem, social skills, scholastic function, social interaction and behaviour. These variables were deemed to be important in light of practitioner experiences and anecdotal evidence. These are considered below.

5.5.1. ASD

Before the study commenced, one of the things considered as a potentially relevant factor which could affect the results was comorbidity. Therefore, it was decided that the research design would incorporate the use of a screening tool. In view of this the children were screened for ASD using the Social Communication Questionnaire (SCQ) whose threshold, according to its manual, states that scores greater than or equal to 15 are highly suggestive of ASD. While reviewing the data post-intervention it was suggested that a reason for lack of significant improvement in self-esteem, social skills, scholastic function and behaviour may have been the presence of comorbid ASD. However, it was found that there was no link between those children with co-morbidity (as signified by a score of more than 15 on the SCQ) and lack of significant improvement.

It is worth noting that the questionnaire did not reflect that one participant already had a formal diagnosis of ASD. This indicates that the measure could only be used as a suggestive guideline rather than an accurate screening tool for measuring the presence of ASD.

5.5.2. Incomplete Treatment

One participant (participant 6), failed to remain on the treatment bed for the full 6 sessions. Ultimately, three of the treatment sessions were disrupted by the participant who moved on and off the treatment couch throughout those sessions. The lack of full treatment could have impacted significantly on the results in self-esteem, social skills, scholastic function, social interaction and behaviour, but also it could have been a contributing factor in his own neuromuscular function improvement scores, which were lower than those for other participants. Only receiving half of the allocated treatment sessions in what was an already short intervention period may have attributed significantly to the results. This type of disruption had not been accounted for in the research design. If it had, extra sessions could have been allocated to a participant in this circumstance.

5.5.3. Speaking During Sessions

Another consideration which could have influenced the results is that 2 participants spoke during treatment (participants 6 and 7). Traditionally, verbal communication is discouraged during Fascia Bowen treatments in practice due to its presumed detrimental effect on the brain's capacity to effect change from manual stimuli in the event that too many other stimuli are occurring simultaneously. One child (participant 6, the same participant receiving incomplete treatment sessions) spoke throughout his treatment session. Not only could this have impacted upon the non-significant findings of most measures, but he was the same individual who improved the least in neuromuscular function. The second participant who spoke only spoke one sentence.

There is no clear pattern which allows us to conclude that speech impacted on treatment efficacy; however, this would be an important consideration in expanding the current research. Future methodology could include attempts to discourage talking during treatment in all participants - perhaps with visual aids and positive reinforcement given after each session as rewards for silence during treatment. Alternatively, future research could measure the frequency of speech during treatment to explore correlation between speaking and efficacy, as no current evidence exists to substantiate the traditional view.

5.5.4. Playtime

Another variable is that in a small number of participants i.e. of the four participants who were treated in school, three were removed from playtime to receive their treatment and this could have had an effect on the results.

However, no conclusive link could ultimately be drawn between the effect of being removed from playtime and efficacy of treatment. Subjective observations noted by the intervention practitioners indicated that children who were removed from playtime may have been displeased, but equally, children who came to a clinic from home may have been displeased with losing free time. Comments made by parents who brought their children to have their treatments at the clinic indicated that their children enjoyed visiting the clinic for the treatments. An additional consideration is that, in the case of children with comorbid ASD, playtime can be an unpleasant social experience, and thus being removed from playtime may in fact have a positive influence rather than a detrimental one.

It was noted that participant 6 stated that he was not happy to be removed from playtime and there are studies which report that a participant's negativity, anger, hostility or distress can result in decreased chances of treatment success (Rounsaville et al., 1987, Teyber and Teyber, 2014). Importantly, this could have impacted significantly on the results of this study.

Additionally, one participant (participant 6) was not given prior notice by his teachers that he would attend the intervention session at a particular time despite prior notification given to the school by the researcher regarding the intervention date and time slot. Receiving prior notice of a non-routine event is an important issue for children with ADHD and ASD and these conditions are often co-morbid in DCD. The other participants treated at school were forewarned by their teachers on every occasion about the treatment sessions taking place on nominated days and times. Future research would provide further guidance, education and information to participating schools about giving the children appropriate notice regarding forthcoming events.

Future research would also take into consideration the confounding variable of the participant's emotional state. Researchers could give children a simple visual scale to denote whether or not they liked coming to the treatments, before and after each session. This would enable the researcher to measure the emotional impact of the treatments itself, any possible distress caused by factors such as coming out of playtime or of not, receiving adequate warning for treatments, and the impact of these on efficacy.

5.5.5. Events Reported by OT

During 2 participant re-assessment sessions the OT observed two things which she duly reported to the researcher. These could have had a bearing on the lack of significant results in some of the measures. Participant 1 was assessed, unlike the other participants, at the end of the school day which also coincided with it being the last day of the Christmas term. The child was reported to be very tired, according to the mother who was present, but she also commented that he had reportedly experienced some of his challenging outbursts during the day, according to his teachers. The mother reported that the child was not in a ‘good frame of mind’ when he came for his reassessment session. During the test the OT noted that the same child was unable to concentrate when she asked him the questions on the questionnaires and so this could have had a significant bearing on the lack of significant improvement in some of the measures. Another child, namely participant 3, was assessed on Christmas Eve and was found to be suffering from the ‘flu on that day. The assessment went ahead as scheduled as there was no opportunity to have the assessment re-scheduled to another day over the Christmas holiday period. Noteworthy is that these two participants were two of three who improved the least in neuromuscular function despite the overall significant result in this part of the research. The other individual improving the least on neuromuscular function was participant 6 who did not receive his complete treatments.

5.6. Other Considerations

5.6.1. Treatment Fidelity

Practising and treating children on a daily basis cannot be compared with administering an intervention which is scientifically controlled and where practitioners must follow a strictly laid-out protocol of treatment moves. Practitioners normally use holistic methods in the treatment of their patients which involve individual changes made to the treatment protocols dependent upon the individual's symptoms and circumstances relating to the historic and current events affecting the individual. The differences between every day practice and a scientifically controlled experiment are immense, e.g. using a different tone of voice while speaking or using different types of eye contact, recognising the sensitivity a patient has to stimuli, such as those who have ASD and often require adjustments to be made to communication processes. Within a controlled scientific trial environment, individualisation is lost and with that the very important aspect of greater potential individual improvements.

In regular Fascia Bowen treatment circumstances parents usually accompany their children in the clinic. Silence is encouraged, thus permitting the child's brain networks sufficient opportunity to effect changes in the body during and after stimulation. This has always been a most important aspect of Bowen and Fascia Bowen teaching protocol. In this study it was not possible for the Fascia Bowen practitioner to insist on silence as this was not included in the ethical approval. A parent's presence could have limited the impact of talking and moving off the treatment couch as they may have ensured that some discipline, silence and stillness were maintained – but all participants in the study received their treatments without a parent or teacher present. As this was a scientifically controlled study, care was taken to avoid informal chat taking place as this could have introduced bias in later reporting, thus reducing the efficacy of the study. Again, this is very different in standard practice. The more tailored the approach of a study, then the less representative it is of true holistic CAM treatment.

5.6.1.1. Expectation and Education

One observation made during the course of this study was that families, teachers and others involved should receive instruction before becoming involved in an intervention. This aspect was particularly highlighted when it was found that one child was not pre-warned about the date and time of his intervention session on any week and neither was he pre-warned that he would be removed from playtime to participate. In addition to this the researcher and practitioners often heard teachers and parents referred to a child as “being that way” or “that’s the way he is”, referring to the child’s clumsiness. This was observed occurring while the child was present in the room, so it could potentially have had the negative effect relating to the child’s self-esteem issues, which, according to the study’s data, did not improve. Self-esteem is often something which can improve over a longer period of time when there is a perceived positive change felt by the child,. but this must be difficult to achieve when those around the child are verbally negative about the child’s personal characteristics. These observations could have had a negative bearing on the outcomes.

5.6.2. Future Research

Based on the results of this study and the existing literature available on the efficacy of Bowen therapy I would recommend that further research is conducted to explore the efficacy of Fascia Bowen in DCD. The study shows a significant result in one domain, namely neuromuscular function and an almost significant result in the domain of control movement. This would need to be explored further in a RCT in order to make more robust assertions about efficacy. The lack of significant result in most other functional aspects of daily living is incongruent with the change in neuromuscular function, but this may simply be due to the short period of intervention in the present research. Therefore, future research should increase the length of the intervention period to further explore potential changes in non-motor domains of life. Additionally there should be more participants taking part to increase the power of the study, and so that a control group could be incorporated to make the research a RCT design.

For any future research the majority of the measures utilised in this process could be re-used apart from the scholastic function, which was not sufficiently robust due to lack of standardisation and normative data. This had been designed by the researcher as no other measure could be found. It is important to note that the lack of funds available for the research limited the choice of available measures and as such, the Self Perception Profile in particular was not the preferred measure to investigate self-esteem but was the only one which was free to access.

5.6.3. Reflections on Researching CAM

The research process highlighted many difficulties, which would have been easier to address had the researcher been an NHS employee, such as having access to lists of children diagnosed with DCD. This was evident from a communication with a GP practice doctor who advised that he did have access to the list but unless I was working within the NHS he would be unable to share the information contained within the list without first communicating personally with the family who would then have needed to give their consent for any communication with the researcher to take place. One further example was that when communicating with schools, the teachers consistently asked if the study was one with NHS approval. One particular school's head teacher informed the researcher that there were a potential seven participants in the school but under their policy they were unable to become involved as the study was not NHS authorised.

Sometimes there are benevolent benefactors (Hill, 2003) or keen individuals, often totally unconnected with the establishment of healthcare provision, charities or CAM professional bodies, who are renowned for having little or no money for research but are passionate about promoting its benefits. While CAM is criticised for its lack of scientific evidence to prove the efficacy of available treatments, often there is no established governmental policy on integrating CAM and conventional medicine and generally there is little written about the relationship between CAM and health promotion (HP) per se (House of Lords, 2000, Ranjan, 1998, Hoffman, 2001). This is understandable given the NHS' reservation regarding interventions lacking a robust, scientific base.

Scriven (Scriven, 1998) states that given the popularity of CAM one would expect to find a reference to HP-CAM interface in papers relating to inter-professional work; however, there is no mention of CAM made at all. Systematic reviews identifying effective alliances for health promotion also did not identify CAM examples in 1999. Gibson et al. mentioned that alternative medicine approaches appear to be synchronised with the underlying core principles and concepts of HP but this relationship could be symbiotic rather than a case of one harnessing the other (Gibson et al., 1995).

The reason for this study was to introduce, through a scientific research process, a novel study into the scientific domain. Until now, the intervention introduced and investigated here had only 30 years of anecdotal evidence to recommend it and the mechanisms by which Bowen and Fascia Bowen are proposed to work are only theoretical at this stage. However, despite the criticism that CAM research lacks good research to recommend it, recruiting participants became a very difficult and frustrating aspect of the study which was originally designed as a gold standard RCT. It was notable that despite the desire of CAM practitioners to be involved in scientific research, when the recruitment process proved difficult and time-consuming, the Fascia Bowen colleagues withdrew their involvement from the study. Additionally the researcher believed that one aspect which was lacking was an ability to work alongside the conventional system of medicine and occupational therapy providers so that a larger study could have been conducted. An integrated approach would have been more desirable and beneficial.

5.6.4. Implications for CAM Research

In addition to introducing a novel piece of research within the present study using robust scientific measures it is accepted that there need to be more rigorous research methods utilised in CAM research as a whole. It is noteworthy that currently there is lack of funding support for CAM research in the UK (Ernst, 1999), and the amount of research relating to CAM does not correlate with the prevalence of CAM use in the UK or with the level of funding available to conventional medicine research (Wider and Ernst, 2003). The research process experienced in this study bears this out as, because, apart from the £1000 provided by the Bowen Therapy Professional Association (BTPA) it was necessary for the researcher to hold a large charitable event in order to raise the funds required to complete the study process. The lack of support for the concept of integrative medicine and collaboration between agencies, departments and the conventional system is a serious issue at present in spite of an increase in CAM research funds between 1999 and 2002. Despite strong recommendations by the House of Lords to the Government for increased funding, this did not occur (House of Lords, 2000, Wider and Ernst, 2003). Additionally the Prince of Wales's Foundation for Integrated Health held meetings with charitable organisations to attempt to persuade more funding to be allocated for CAM research. While this and the House of Lords advice did improve the situation slightly it was not sufficiently impacting to make a significant difference. Furthermore, the Department of Health's CAM funding initiative states that it will only fund individuals researching rather than projects, so CAM research funding in comparison with conventional funding availability remains low. Additionally, Ernst stated in 2003 that despite many applications for an increase in these funds no significant progress had been made and the researcher could find no more recent discussion on this topic (Wider and Ernst, 2003). It is hoped that the CAMbrella organisation, referred to in the literature review, will assist in the promotion and instigation of a good body of scientific evidence but that it will also perform an important role of dissemination of existing literature into a meaningful and usable bank of accessible knowledge. All of this can only serve to enhance credibility for CAM, ensuring that it is backed up by the most robust evidence.

This study has made a significant contribution to research within CAM for a number of reasons. It is a well-designed study, in line with the recommendations of the MRC framework for research (MRC, 2000), because it has utilised internationally recognised, robust measurement tools. Additionally, it is the first scientific study investigating the Fascia Bowen intervention, and importantly, the results demonstrate a significant improvement occurring in neuromuscular function, indicating the success of the intervention. It also highlights the difficulties of researching CAM, whose main principles include the importance of individualising treatments for each person receiving treatment. Many in CAM practice believe that if this is not done then a true representation of effectiveness of CAM treatments and reality of the daily practice setting cannot be replicated using a non-individualised treatment protocol. Here, the study's intervention followed one treatment protocol designed by the creator of Fascia Bowen; since there is no other method available, and the treatment could be reproduced in further studies, this is a strong point, as CAM is criticised for not producing protocols which can be replicated in a scientific setting. The researcher undertook best efforts to ensure treatment fidelity with the use of spot-checks, with the aim of minimising the introduction of extraneous variables – another positive impact of the study. The research is useful because it informs future research, e.g. using a larger sample group. As there have never been studies using Fascia Bowen in the past, the significant result will facilitate further investigative research using Fascia Bowen because the present study will have already demonstrated efficacy and a sound methodological base. So much CAM research is criticised, as discussed in the literature review of the study, for its lack of sound methodology and its failure to meet scientific research criteria, but this study has demonstrated that it is a rigorous and well-designed trial. A further significant contribution to CAM research is that it is the first Fascia Bowen trial working with children diagnosed with dyspraxia/DCD.

As previously indicated in the literature review, the future of Fascia research specifically requires an international consensus to be reached regarding current terminological inconsistencies. Bearing this in mind, it is hoped that when the 4th Fascia Research Congress convenes in Washington DC in September 2015, that Dr Stecco will be reviewing all contributions in this debate. She will preside over a pre-conference 'Anatomy Consensus Meeting', devoted only to this issue, so that an agreement can be reached regarding nomenclature. If agreement cannot be reached then there is an expectation that, at least, the discussion will move forward (Chaitow, 2014a).

5.6.5. Implications for Fascia Bowen

The study found significant improvement in the neuromuscular function of the children and a significant improvement in their control movement, but non-significant results were demonstrated for the psychological aspects of the study.

According to the teacher measures of the SDQ a negative impact was detected on the social skills of the children. Anecdotal evidence gathered from parents and teachers at Fascia Bowen clinics over 20 years indicates that, apart from the neuromuscular improvements, psychological and scholastic improvements do occur, so the non-significant results of the psychological, negative impact on the teacher reported social skills and scholastic aspects of the study were unexpected. On reflection, the short timescale over which the intervention was conducted, together with the small sample size, could have had a real bearing on this result, and this will be particularly helpful when designing and conducting further research studies in this area using Fascia Bowen. The literature review for the study indicates that bottom-up interventions tend not to equate to improvements in functional skills; however, there were anecdotal reports of particular changes in these within the study although they were not reported using formal qualitative reporting techniques. As a consequence, the anecdotal evidence will fail to carry scientific weight from this study. The results signify the necessity for a longer intervention period, a larger sample size (including a control group), and the use of formal qualitative reporting strategies incorporated pre and post intervention. Including these suggested changes could potentially affect the outcomes significantly for the next study.

6. Conclusion

The main results were that the sample of children showed a significant improvement in neuromuscular function from pre to post Fascia Bowen intervention. This answered one of the study aims very clearly. The result is also in line with anecdotal evidence from practices over 20 years, and shows the efficacy of the therapy to effect improvements in the domain of neuromuscular function. Additionally, there were positive changes in one scale of the DCD-Q, namely in the control movement subscale which showed a significant improvement.

The purpose of the study was to investigate improvements not only in neuromuscular function but also in the psychological wellbeing of boys with DCD. Although the children did show significant improvements in neuromuscular function and one subscale of motor function, the same improvement was not seen in the other measures investigating self-esteem, social skills, scholastic function and behaviour. This shows that although the intervention targeted muscular systems and resulted in significant changes, these neuromuscular changes did not produce concurrent changes in psycho-social functioning. Therefore it would be important to conduct further research which used the lessons learnt from this study to make changes in the design. An important consideration would be to include a control group, a larger sample size, a longer intervention period, consistency of reporting by teachers on measures, and the establishment of more discipline during the intervention sessions. In this way it would be expected that the other measures would be more likely to show significant results also.

It is notable that top-down changes in skills are not always generalizable, so a possible way forward with the next research could be that, with adequate validation, control trial and blinding, recommendations could be made for Fascia Bowen to be utilised in combination with top-down interventions to produce functional skill and generalizable changes in neuromuscular function, compared with top-down alone and bottom-up alone, to better investigate the effect these interventions and combinations have on immediate skill acquisition and generalizability.

The results will hopefully lead to further efficacy research within the field of Complementary and Alternative Medicine, and potentially, more CAM practitioners will follow the lead of this author by conducting scientific research using CAM interventions while ensuring that they adhere to scientific rigour and the use of high quality methodology. In particular, the research would recommend that future research using Fascia Bowen as an intervention should involve collaboration between 3 specialists, namely a Fascia Bowen practitioner, a neuro-physiologist and a Fascia research scientist.

This thesis has offered the opportunity to present a novel research process involving an emerging therapy called Fascia Bowen. It may be helpful in restoring normal connective tissue architecture function whose stimulation subsequently results in an improvement to the mechanisms involved in DCD. The results of the investigation showed significant improvements in neuromuscular function in the cohort of boys with DCD using robust methodology. It offers a positive addition to existing CAM literature, as well as demonstrating that it is possible to apply sound methodology to CAM research – and, significantly, that it is important to consider non-mainstream treatments as they offer an option which could be very effective.

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APPENDICES

APPENDIX 1 -
DEVELOPMENT OF AND TECHNIQUES IN FASCIA THERAPY

The reason for increased fascia understanding is due to newly developed assessment capability/methods, in vivo bioelectrical impedance, and tissue imaging procedures. These have led to enhanced acuity in assessment of fascial behaviour i.e. the differences in behaviour between pathological and healthy fascia, as demonstrated in a study to assess the effectiveness of osteopathic manipulation, utilising high-resolution ultrasound conducted by Tozzi et al (Tozzi et al., 2011). Similarly, the importance of endoscopic surgery conducted by Dr. Jean-Claude Guimberteau, MD, using full high definition camera equipment, with 4 millimetre and 2.5 millimetre lenses, has provided the scientific community with a colourful insight into the structure and diversity of this tissue but simultaneously it has also improved understanding about fascia and this often deviates from previous understanding of its function (Dr. Jean-Claude Guimberteau, 2012). Our limited knowledge, and, to a certain extent, neglect of fascial tissues prior to these advances, were, in part, due to Western anatomy methods of scalpel use to dissect many sections of fascia followed by naming them according to the functional role of tissues and structures nearby. While it is perfectly feasible that bones and muscles can be counted, this is not so for the fascia as it is too numerous throughout the body (Schleip et al., 2012b). As a large, body-wide, networking organ it incorporates hundreds of bag-like structures and rope-like local densifications with pockets lying within other pockets. All of these are interconnected by robust septa, or partitions, and looser connective layers of tissues (Findley, 2012). Importantly fascia includes loose and dense forms of tissue, superficial and deep, multiple and single-layered connective tissues (Langevin and Huijing, 2009). Explanations utilising a three-dimensional model for fascia have now become easier due to modern methods of investigation using systems analysis and digital modelling techniques which are advanced and more task specific (Schleip et al., 2012b).

Its many descriptive definitions are as numerous and varied as the authors writing about it and these authors are scattered around the world. Their explanations and/or understanding of fascia is heavily influenced by their own area of specialisation. This was particularly evident at the first UK Fascia Symposium held in Windsor in May 2014 where the dialogue was recorded and can be accessed if required by those practising in fascia interventions (The British Fascia Symposium, 2014) where a senior anatomy and physiology professor, from a leading UK medical school's post graduate department, disagreed with one of the world's leading fascia research scientists. The argument centred on the terminology used on this subject but also on the functional role and significance of different types of fascia. Where a traditionalist views the fascia related to a single organ in total isolation the fascia research scientists examine the entire body's fascia as a large, networking but single organ in its own right (Schleip et al., 2012a) . The disagreement revealed that there is a crucial difference in understanding between the traditional Western published materials on fascia and authors from other countries. The consequences of this lack of consensus means that successful dialogue between scientists and anatomists about fascia's role in body functioning will not occur. Gray's Anatomy, the most widely respected and utilised text by UK medical schools today and according to Schleip, misses vital information which could lead to a better understanding of particular types of fascial tissue (Schleip., 2014). In view of this, there is an urgent need for an internationally agreed definition to be established. If this occurs then all specialists involved in research and medical education will be enabled to communicate effectively and scientifically in what is a relatively new research domain. Progress is beginning to take place on this issue since the first Fascia Research Congress in 2007 (Langevin and Huijing, 2009).

A review was undertaken (Schleip et al., 2012b) to demonstrate a comparison between the three most common nomenclatures utilised by two organisations and in one published book. These were:

- The Federative International Committee on Anatomical Terminology (FCAT) (1998)
- The most recent edition of the Gray's Anatomy (Standring, 2008)
- The last Fascia Research Congress (FRC) in (2012)

From the Fascia Research Congress' most recent conference it was suggested that twelve different terms, relating to fascia, should assist in clarifying this terminology debate (Langevin and Huijing, 2009). These terms are; dense connective tissue, areolar connective tissue, superficial fascia, deep fascia intermuscular septa, interosseal membrane, periost neurovascular tract, epimysiumIntra and extramuscular aponeurosis perimysium endomysium. By using these terms Langevin et al suggest that improved communication can be achieved between the experts across different fields of specialisation.

Schleip states that there is no other area of anatomical science which has such conflicting terminology as that which is associated with fascia related connective tissue (Schleip et al., 2012b). Many authors refine their definition of fascia to dense, sheet-like connective tissues to describe the fibres which are arranged so that they favour a single directional presentation. If the presentation deviates from this then it is called irregular. This is incorrect according to Benetazzo et al because some fascia types present in a regular lattice-like format with the fibres crossing each other at precise angles (Benetazzo et al., 2011). Some authors include the soft, transparent layers such as those located in the hypodermis or those located in the envelopes presented around very small vessels. Other authors limit their definition of fascia to muscular connective and visceral connective tissues regardless of their movable or more ligament-like format. Some of the more clinically focused literature focuses, largely, on visceral fascia (Schwind, 2006, Paoletti, 2006).

APPENDIX 2 -

FACIA BOWEN FOR RESEARCH - PROTOCOL

BY HOWARD PLUMMER 2013

FOR THE DOCOTRAL RESEARCH OF MELANIE MORGAN-JONES PD HEALTH.

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1) BOTTOM STOPPERS

2) TFL - GLUT MOVE

Perform three moves over gluts

3) POPLITEAL FOSSA AND HEAD OF HAMSTRING MOVE

4) THREE MOVES UP THE ILIOTIBIAL BAND

5) OPEN THE TRUNK (SPINALS)

Between the bottom & top stoppers - lateral move

6) FACIA MOVES - COCCYX LEVEL ACROSS GLUTS

Medial to lateral move covering all of the glut area to the level of the pelvic bone

7) FACIA OVER TRUNK

Between the bottom and top stoppers - working from the outside (laterally) of the body to the spine - medial to lateral move.

8) TOP STOPPERS

9) SHOULDERS/ARM/HAND – FACIA

Start at the spine outwards across the shoulders make two medial to lateral moves over the top of the shoulder/suprasinatus area work down the arm including hand and fingers - medial to lateral (or up and down) stroking to the arms can be done here.

10) RHOMBOID MOVE

11) MOVE OVER LATISSIMUS DORSI (UNDER SCAPULA)

12) BREAK FOR A COUPLE OF MINUTES

13) FACIA MOVES - SPECIAL LATT MOVE HOLDING WITH POINT

Make an up and down move at the edge the body where the arm begins. This is also part of the latts, hold this point while performing the rest of this procedure.
Trace the latt' down and make two medial moves
Using the thumb trace across the top of the pelvic bone from outside of the body to the spine with medial to lateral moves
Using the palm of the hand place hand with fingers facing upwards on the spinals and work from the bottom to the top as far as you can with up and down moves (medial to lateral).
Next do the usual glut move and hold this point while working down the leg.
Work down the entire outside of the leg from the top to the bottom with fingers facing downwards towards the floor/couch and make an up and down move, when at the ankle make two medial moves over the Achilles tendon.

14) HAMSTRINGS - GENERAL HAMSTRING MOVE INCLUDING MOVING THE FOOT AND TAP THE FOOT.

CONTINUE NOW WITH FACIA TO THE LEG UP AND DOWN MOVE

15) SAC - ENGAGIN SACRAL POTENECY - ONE HAND ON THE SACRAL THE OTHER HOLDING BETWEEN THE SHOULDERS

Working with a gentle circular movement anti/clockwise then clockwise and again anti/clockwise.

BREAK FOR AROUND HALF A MNUTE

16) CLOSE THE TRUNK

17) LUNG/ASTHMA MOVE

Using the heel of your hand across the erector spinae on the opposite side of the body.

TURN CLIENT OVER

18) HIT THE LAT

19) LUNG/ASTHMA MOVE CONTINUED (BOWEN MOVE)

20) LEG FACIA INCLUDING FOOT

Work the leg from top to bottom including the foot with Facia Bowen move is up and down.

21) DO NECK PAGE 3 - SCALENUS BUT MOVE OVER ALL THREE AND SPINAL CAPITAL AREA

22) STERNOCLEIDO MASTOID & HEAD FACIA

Working with facia Bowen moves and cover the neck face & head, steady and slow and gentle (finger light) just moving the skin.

23) HOLD THE HEAD - PLACES HANDS UNDER THE HEAD AND RELAX

24) FINISH WITH THE SCARUM MOVES (ON FEET) SACRAL PROCEDURE

APPENDIX 3 -

72 SEARCH STRATEGIES UTILIZED TO ARRIVE AT LITERATURE FOR RESEARCH DESIGN

Example of Key words and terms utilised to clearly set out an appropriate search strategy for inputting to the following databases available via the Bath University Moodle. Databases searched were MEDLINE, PUBMED, WEB OF KNOWLEDGE, PsycNet and SCOPUS but I was able to utilise this strategy for each one.

- 1‘developmental coordination disorder’ .mp.
- 2exp developmental coordination disorder/
- 3DCD.mp.
- 4clums*.mp.
- 5‘clumsy child syndrome’.mp.
- 6inco?ordinat*.mp.
- 7‘perceptuomotor dysfunction*’.mp.
- 8dyspraxia.mp.
- 9dysgraphia.mp.
- 10‘development* dyspraxia’.mp.
- 11‘deficits in attention, motor control, and perception’.mp.
- 12‘specific development* disorder* of motor function*’.mp.
- 13‘psychomotor disorder*’.mp.
- 14‘sensorimotor difficult’.mp.
- 15‘sensory integrat* dysfunction*’.mp.
- 16‘sensory integration’.mp.
- 17‘nonverbal learn* disability*’.mp.
- 18‘mov* disorder*’.mp.
- 19‘developmental right hemisphere syndrome’.mp.
- 20‘minor neuro* dysfunction*’.mp.
- 21‘minimal brain dysfunction*’.mp.
- 22‘development* apraxia’.mp.
- 23‘development* apractic’.mp.
- 24‘physical* awkward’.mp.
- 25‘motor delay*’.mp.
- 26‘motor skill* disorder*’.mp.
- 27‘motor* awkward’.mp.

- 28‘motor impair*’.mp.
- 29‘perceptual motor difficult*’.mp.
- 30‘motor-perceptual dysfunction*’.mp.
- 31‘motor learn* disabilit*’.mp.
- 32exp Motor Skills Disorders/
- 33exp Motor Skills/
- 34exp Developmental Disabilities/
- 3533 and 34
- 361 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 35
- 37exp ‘quality of life’/
- 38quality of life.mp
- 39QOL.mp.
- 40HRQ?L.mp.
- 41health?related quality of life.mp.
- 42health status
- 43functional status.mp.
- 44well?being.mp.
- 45self?esteem.mp.
- 46self?worth.mp.
- 47self concept
- 48exp Activities of Daily Living/
- 4activit* of daily living.mp.
- 50ADL.mp.
- 51exp leisure activities/
- 52leisure.mp.
- 53recreation.mp.
- 54sport*.mp.
- 55play*.mp.
- 56interpersonal relations
- 57exp friends/
- 58friend*.mp.

- 59participation.mp.
- 60exp social support/
- 61exp social isolation/
- 62loneliness.mp.
- 63exp personal satisfaction/
- 64life satisfaction.mp.
- 65motor activity
- 66exp psychomotor performance/
- 67depression.mp.
- 68anxiety.mp.
- 69exp learning disorders/
- 70occupational performance.mp.
- 71parent* perspective*.mp.
- 72child* perspective*.mp

Keyword search strategy utilised. Ideas with acknowledgement to (Zwicker et al., 2013a).

APPENDIX 4 -

ETHICS – PSYCHOLOGY APPLICATION

1. Title of project

Does Fascia Bowen therapy improve neuromuscular function and psychological well-being in males aged 8-11(at primary school) diagnosed with Developmental coordination disorder? (DCD).

2. Purpose of this project and its academic rationale

DCD's involve learning difficulties primarily related to the development of motor skills(Clayton and Dodd, 2005). Based on the prevalence rates of DCD of approximately one in ten children affected, one would expect to find approximately 3 children affected within a classroom of 30 (Dyspraxia Foundation, 2012). Those with DCD present with co-ordination difficulties (e.g. ball-catching skills) organizational problems, memory dysfunction, speech issues, reading and writing difficulties, posture and balance issues (Kirby, 2011). Their listening capabilities are usually compromised and they often have poor socialization skills and clumsiness (Chen and Cohn, 2003). This often leads to feelings of low self-worth (Skinner and Piek, 2001), however, self-perception research as reported by the children themselves is limited at this time. Due to the difficulties reported above research indicates that it leads to behavioural problems where they tend to 'act out in class more than other children', for example behaving like the class clown(Barnhart, 2003).

The impact of motor difficulties with the resultant low self esteem and behaviour issues have been shown to lead to academic under-performance (Kirby et al., 2008). By the time they reach 16 they are five times more likely to experience psychiatric problems than their peers.(Dyspraxia Foundation, 2011). (Weir et al., 2012). Currently, there is no standardized treatment for DCD and few published studies about the efficacy of various treatment options. The choice of treatments for DCD vary according to the individual's particular difficulties and include psychological therapies, occupational therapy, physiotherapy and Fascia Bowen Therapy (NHS Choices, 2012).

Fascia Bowen is a non-invasive, soft tissue remedial therapy involving gentle, hands-on procedures. There are guidelines within the training about which moves must precede others and which procedures cannot be done more than once. No drugs are administered with this therapy and the practitioners do not diagnose conditions (Bowen Therapy Professional Association, 2012). Its aim is to enable the body, through stimulation, to re-align its structural soft tissue at a deep level. This includes muscular and neural tissues. The anecdotal evidence indicates that it could address functional imbalances, changes in chemical composition and, potentially restore homeostasis or physiological equilibrium (Bowen Therapy Professional Association, 2012). Together, these improvements are thought to improve the health and well-being of patients at both the physiological level, but also the psychological level, and their quality of life. However, this is based mostly on anecdotal evidence gathered from Fascia Bowen clinics over the last 15-20 years.

The proposed research is a pilot study that aims to quantify the efficacy of Fascia Bowen as an intervention at both a physical and psychological level. This is a novel area which has not previously been tested in a scientific manner.

The purpose of this project is to assess the effectiveness of Facia Bowen therapy in the following areas:

- neuromuscular function
- motor skills function
- scholastic function - attention, concentration span, handwriting and work completion rate
- social interaction
- self- esteem
- behaviour

3. Brief description of methods and measurements

Intervention:

Participants will be randomly assigned to 1 of 2 groups, treatment or control. The children in the treated group will receive the Fascia Bowen intervention individually from a qualified therapist each week for 6 weeks. Fascia Bowen is a non-invasive, soft tissue remedial therapy involving gentle, hands-on procedures. Children in the control group will receive a foot and hand massage each week for 6 weeks from an appropriately qualified practitioner. Treatment times in both groups will be matched at approximately an hour or less per session per child, and children in both groups will receive treatment in both prone and supine positions. The treatment and control interventions will run at approximately the same time to reduce introduction of seasonal variables. Sessions will take place in a private room in the child's school or a non-NHS clinic, depending on what is most convenient for the participant and their family. The manner of interaction between practitioner and child will remain consistent regardless of conditions.

Measures:

Child:

Motor function will be assessed using the Motor skills Assessment Battery for Children 2 (MABC-2) (Henderson, 2007). The MABC-2 takes 30 minutes to complete and involves 8 tasks which cover manual dexterity, ball skills, static and dynamic balance (see appendix 6). The assessment will be carried out by an Occupational Therapist(OT). The administration of this measure requires qualification as a medical professional i.e. Dr, Nurse, OT. The OT's in this study perform this assessment on a regular basis as part of their standard practise.

Self esteem will be measured using The Self Perception Profile for Children (SPP) (Harter, 1985). The SPP is a self-completed questionnaire which has five subscales which cover perceived domain-specific scholastic competence, social acceptance, athletic competence, physical appearance, behavioural conduct as well as overall self -worth. The SPP uses a 'structured alterative format' whereby each item contains two associated statements, each statement having a choice of two responses each, thereby providing a four point scale for each item (see appendix 11). This is a self-completed questionnaire which requires no standard level of training or competence to complete. The researcher will train the OT to assist the child with the completion of this measure e.g. help with reading.

Social skills will be assessed using the Susan H. Spence Social Skills Questionnaire-Pupil (SSQ-Pu)(Spence, 1995). This is a 30 item questionnaire using a 3-point Likert-type rating scale. The item has 3 subscales covering 'conflict resolution/avoidance', 'warmth and empathy' and 'social involvement' (see Appendix 8). This is a self-completed questionnaire which requires no standard level of training or competence to complete. The researcher will train the OT to assist the child with the completion of this measure e.g. help with reading.

Parents/guardians:

The Developmental Coordination Disorder Questionnaire - parent version (DCDQ-P) (Wilson et al., 2009) will measure their child's motor performance in everyday functional activities using 15 5-point Likert scales. It is factorised in to "control during movement", "fine motor and handwriting" and "general co-ordination" subscales (see appendix 5).

Self esteem will be measured using The Self Perception Profile for Children (SPP)(Harter, 1985). The SPP is a questionnaire suitable for parents and teachers which has five subscales which cover perceived domain-specific scholastic competence, social acceptance, athletic competence, physical appearance and behavioural conduct and one scale assesses overall self -worth. There are 15 items, three per domain. The SPP uses a 'structured alterative format' whereby each item contains two associated statements, each statement having a choice of two responses, thereby providing a four point scale for each item (See Appendix 12).

Social skills will be assessed using the Susan H. Spence Social Skills Questionnaire-Parent (SSQ-P)(Spence, 1995). This is a 30 item questionnaire using a 3-point Likert-type rating scale. The item has 3 subscales covering 'conflict resolution/avoidance', 'warmth and empathy' and 'social involvement' (see appendix 8).

Behaviour will be measured using the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997).The SDQ measures 5 subscales covering emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and pro-social behaviour. It has 25 items in the format of a 3 point Likert scale (see appendix 13).

A post study interview involving open ended questions will be completed over the telephone to establish if there were other improvements or issues that arose during the research study period.

A post study interview involving open ended questions will be completed over the telephone to establish if there were other improvements or issues that arose during the research study period. This interview will be devised after the commencement of the study to enable inclusion of recurring topics and issues identified by the researcher, practitioners, school staff and participants.

<u>Teacher</u>

As no short, validated Scholastic function measure can be identified, an appropriate questionnaire has been designed by the researcher. This will consist of 4 Likert scales to measure attention, concentration span, handwriting and work completion rate (see appendix 7).

Social interaction will be measured using the Spence Social Skills Questionnaire - teacher version (SSQ -T)(Spence, 1995). This is a 30 item questionnaire using a 3-point Likert-type rating scale. The item has 3 subscales covering 'conflict resolution/avoidance', 'warmth and empathy' and 'social involvement' (see appendix 10).

Behaviour will be measured using the Strengths and Difficulties Questionnaire - teacher version (SDQ-T) (Goodman, 1997). The SDQ measures 5 subscales covering emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and pro-social behaviour. It has 25 items in the format of a 3 point Likert scale (see Appendix 13).

A post study interview involving open ended questions will be completed over the telephone to establish if there were other improvements or issues that arose during the research study period. This interview will be devised after the commencement of the study to enable inclusion of recurring topics and issues identified by the researcher, practitioners, school staff and participants.

Treatment Fidelity

Treatment fidelity will be measured by ensuring that 10-20% of the treatments are observed and rated by an experienced Facia Bowen practitioner and a practitioner qualified in massage techniques.

Method:

This research project will be a two arm, mixed method, randomised control trial pilot study carried out at primary schools and non-NHS clinics throughout Berkshire, Oxfordshire and Wiltshire.

The participants will be visited either at their own school, their home or at a non-NHS clinic by an OT for assessment and practitioner for treatment or massage depending on which is most convenient to the child and family.

In week 1 the participant assessments will be carried out. An OT will visit each child and will gain the child's assent. The OT will also administer the scholastic function scale, SSQ-PU measure and will give the SDQ to the appropriate member of school staff. The SDQ will be returned to the Head Teacher within one week and collected by or sent to the researcher. The OT will complete the MABC-2 with the participant and will also assist them to complete the SPP and SSQ-PU. A Reading University research placement student will contact the parents/guardians of the participants during the same time to complete the SSQ-P, DCD-q, SPP, SDQ, social measures by telephone. A suitable teacher to complete the questionnaires (most likely the class teacher) will be identified by the Head Teacher and questionnaires will be posted to them. They will be returned to the Head Teacher within one week and collected by or sent to the researcher by post.

In weeks 2-7 the interventions will take place. The participants will be randomly allocated to one of the two groups. The intervention and control sessions will take one hour or less each time and each participant will receive one session per week for a total of 6 weeks. In the event of a child being ill or absent from school, the child will continue with the next scheduled session at the next available time i.e. each participant will receive 6 sessions, but this may be over 7 or more weeks.

In week 8 the children will be re-assessed. The OT will visit each child again and complete the MABC-2 and will help the child complete the SPP and SSQ-PU. A Reading University research placement student will contact the parents/guardians of the participants during the same time to complete DCD-q, SPP, SDQ, SSQ-P measures and the open-ended questionnaire by telephone. The scholastic function scale, SSQ-T measure and SDQ will be given to the identified staff member and these will be returned to the Head Teacher within one week and collected by or sent to the researcher by post.

Although not all participants may complete weeks 1-8 at the same time, they will receive the intervention over two school terms. The sessions will be as close in time for both groups to ensure that any seasonal and school changes are matched.

The data collection will begin from July 2013. It is expected that this will continue until June 2014. All data will be collected and analysed before August 2014.

4. Participants; recruitment methods, number, age, gender, exclusion/inclusion criteria:

Participants

30 Males aged 8-11, diagnosed with DCD, or previously assessed by an OT with MABC scores of at or below 15th centile, will be recruited to take part in the study. All participants will come from mainstream schools.

Exclusions criteria will include the presence of co-morbid conditions including hemiplegia and cerebral palsy, if participants are non-ambulant (i.e. unable to walk or move under their own volition), girls will not be included and all participants will be without intellectual disability as stated on their statement of special educational need (or lack thereof).

Recruitment

Participants will be recruited from mainstream primary schools. Initial information sheets(see appendix 1) will be sent out to Head teachers of the schools by the head of Special Educational Needs (SEN) of the relevant Local Authority, e.g. West Berkshire, Oxfordshire and Wiltshire. The Head Teachers will then register their interest with the SEN head within one month if they have potential participants within the research criteria. Research information sheets for parents/guardians(see appendix 2) and the child(see appendix 3)and consent forms(see appendix 4) will be sent out to each participating school for onward transmission to the suitable parents/guardians. This would comply with confidentiality issues.

Parents/guardians will have 1 month to consider the research, and indicate consent by returning the consent form to the researcher direct using the pre paid envelope supplied. The consideration time has been limited to enable reasonable completion of the study and to avoid confounding variables such as seasonal changes. Only consent forms returned within the month will be considered. The researcher will contact the Head Teacher 1 week before the month deadline has expired to ask if they can remind the suitable parents/ guardians about the deadline.

The OT's will be recruited by the head of SEN and through the non-NHS clinic network. The Fascia Bowen practitioners will be recruited through the Bowen Therapy Professional Association and Fascia Bowen teaching staff. The massage therapists will be recruited through the non-NHS clinic networks where they work, or the Fascia Bowen therapists will be trained by a qualified massage therapist to conduct the massage therapy.

In the event that the head of SEN can no longer be involved, or insufficient numbers are recruited within a month of the initial distribution of letters to schools, then participants will be recruited through advertising, a short information leaflet through the local press, support groups (such as the Dyspraxia Foundation), community centres, libraries, local children's centres and activity centres. Parents/guardians will contact the researcher directly. The complete information for child and parent plus consent forms will then be sent to parents directly with a SAE for return by post.

5.**Consent and participant information arrangements debriefing.**

Initial information sheets (see appendix 1) will be sent out to the Head Teachers of the schools by the head of Special Educational Needs. The Head Teachers will then register their interest with the head of SEN within one month if they have potential participants within the research criteria. Research information sheets for parents/guardians(see appendix 2) and the child (see appendix 3) and consent forms(see appendix 4) will be sent out to each participating school for onward transmission to the suitable parents/guardians. They will have one month to consider the research and indicate consent by completing, signing and dating the consent form. The consent forms will be returned to the researcher direct stating that they fully understand the purpose of the research, that their involvement will be entirely voluntary and that they can withdraw at any time as detailed in the parent and child information sheets. During the first session of the study the OT will show the child the information sheet, help him to read through it and ask if he has understood it, ask if he has understood what the research entails, whether he has any questions, whether he has understood that he can drop out at any time and whether he would still like to take part. The researcher will train the OT in the delivery of this session including the stated procedure above. If the child has understood the nature of the research, that he can drop out at any time, his questions have been answered and he would still like to take part then this will be taken as verbal assent. After taking part in the research study, participants will receive a de-briefing sheet that completely explains the nature and purpose of the research study. Participants will be free to ask questions at any point during the research. Participants i.e. children in the control group will be offered free fascia Bowen therapy treatment for 6 weeks after the study is concluded and these sessions will be available at the schools with permission from the Head Teacher or at the private non-NHS clinics. If parents/guardians request, the researcher will provide individual feedback concerning improvements. If the parents/guardians wish to be present during the intervention sessions they will be encouraged to meet with the OT or therapist immediately before a scheduled session. At that time the therapist will demonstrate aspects of the procedure and show them the therapy room. The parents/guardians will have the opportunity to settle the child in the room before the intervention takes place. The information regarding this will be fully outlined in the information sheet.

If the child assents and is subsequently reluctant to participate fully(i.e. doesn't wish to get up on the couch) the practitioner will explain the process to the child and encourage them to ask questions and explore the environment in an attempt to allay their concerns. The child will regularly be reminded that they can withdraw from the study at any time.

6. Ethical considerations raised by the project

The study will conform fully to the Good Clinical Practice (GCP) directives and guidelines whose aim is to ensure that each subject comes to no harm, their rights will be protected as will the trial's data. Any personal details will be treated with the utmost confidentiality and all paperwork will be held in a locked cabinet. The parents/guardians will be asked to sign a consent form in order to participate in the study. The children will give their assent to take part in the study.

All those involved in the study will be given a month before the trial to make any enquiries about what will take place and what will be the objectives. The information about the trial, together with any consent forms will be worded simply and accordingly with no use of jargon or technically confusing information. All terms will be explained fully in the 'Information to participants' letter.

No pressure will be placed upon the participants to continue or to withdraw from the trial. If any of the information sheets or consent forms are revised with any new and important information then these will need to be approved by the ethics committee before continuing.

Demonstration of Ethical Considerations

This research will conform to the Declaration of Helsinki (Association, 1964 but revised in 2008) and Good Clinical Practice (GCP) (GCP, 2006) governance procedures, prioritising, at all times, safety and confidentiality. A GCP Trial Master File will be compiled, detailing every stage of the investigation and progress of the subjects through the experimental procedures.

During the study the children, parents/guardians and teachers will take part in structured interviews designed to elucidate psycho-social factors influencing their physical activity profiles. They will also be asked to complete questionnaires. At no time will the parents/guardians or participants be placed at risk. They will be treated with respect and their dignity will be protected at all times.

Particularly important is the consideration that children are vulnerable and children are always eager to please so careful consideration will always be given to the relationship between the participant and researcher with the highest standards of professionalism being maintained at all times. The responsibility for the participants' safety must always rest with the professional in charge and not with the participants.

All the children's responses can be kept confidential unless they disclose risk of harm to themselves or others. This would also include a disclosure of very low mood or safeguarding issue during assessment or intervention. If this were the case then the practitioner would be duty bound to inform the researcher who would then inform the parent/guardian(unless the risk of harm was from the parent/guardian) and the research supervisor.

Every OT and practitioner involved in the research will have full Disclosure and Barring certification and they will be fully qualified in their field of expertise. Each Headteacher will be given a copy of the Disclosure and Barring certification for each practitioner who will work with the children in their school. The parent/guardian of each child will be provided with a copy of the certification upon request from the researcher. Information on how to do this will be given in the information sheet for parents/guardians(Appendix 2).

The rights of the participants must be protected so that they can withdraw from the study at any time. The relationship between participant and researcher must not change if the participant withdraws.

Consideration will given to the possible negative impact on the child's self -esteem and /or academic progress by removing him from the class environment for an hour or less on a weekly basis for 8 weeks. If the child, parent or teacher reports that a negative impact outweighs the positive effect of the study then the child will be withdrawn from the study.

In the case like this where there are vulnerable participants and or minors, consent must be gained from the parent or guardian.

The participants will have the right to know the study's outcome.

Within the protocol of the study the information regarding funding, any sponsorship, institutional affiliations, conflicts of interests, participant incentives or compensation must be declared.

The effects of the intervention must receive continuous evaluation.

Ethical approval must be in place before the research commences.

7. **Estimated start and duration of the project**

The data collection will begin from July 2013. It is expected that this will continue until June 2014. All data will be collected and analysed before August 2014.

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9. Appendices

Appendix 1 - Initial contact letter to Head Teachers from SEN-Rhian Ireland at the West Berkshire District Council(WBDC).

Awaiting same letter but on headed note paper from Rhian Ireland.

Dear Headteacher

I have been approached by a student from University of Bath, Melanie Morgan-Jones, who is undertaking her Doctorate. Her area of interest is children with Developmental Coordination Disorder (DCD) or those with motor difficulties. Her research question is about the benefits for motor skills, and psychological factors such as self-esteem, following an intervention called 'Fascia Bowen Therapy'. Her target group is males, aged 8-11 years who are either diagnosed with Developmental Coordination Disorder (DCD) or dyspraxia or who scored at the 15th centile or below on an assessment administered by an Occupational Therapist called MABC-2. Her supervisors are Dr Chris Ashwin at the University of Bath and Dr Fiona Knott at the University of Reading- who many of you will have heard of from her work in the West Berkshire area in CAMHs.

Her study would involve using the Fascia Bowen Therapy with a group of individuals and also having a control group. She would likely be looking to do this work in the Autumn Term 2013 and the intervention would need be conducted in the school with each child requiring permission to be treated and assessed weekly for 8 weeks. Each session would take an hour or less, and a small private room would be needed for the sessions. A teacher or member of staff who works closely with the child would be asked to complete some short questionnaires too.

If you think you may have children who meet her criteria and would be interested in being a part of this innovative study please could you contact me as soon as possible, I will pass on your details to Melanie.

Kind regards,

Rhian Ireland
Learning Support Services Manager
SEN and Disabled Children's Team

MMJ-PD Health June 2013

Appendix 2 - Information sheet for parents/guardians

Does Fascia Bowen Therapy Improve Neuromuscular Function and Psychological well-being in males aged 8-11(at primary school) diagnosed with DCD?

My name is Melanie Morgan-Jones; I am a Health Research Professional Doctorate student with the University of Bath, studying neuro muscular function improvements in children with Developmental coordination disorder (DCD)/ Dyspraxia. My supervisors are Dr. Fiona Knott and Dr. Chris Ashwin who are psychologists specializing in work with children. I would like to invite you, your child and a teacher at your child's school, to take part in this study. Before you decide, it is important that you understand why the research is being done and what it will involve for you. Please read the information on this sheet carefully before you make a decision. You will have an opportunity to ask questions which you may have before agreeing to participate by contacting me on the telephone number or email address provided. If you want to mention the study to your friends and family before you make your decision then please do.

What is the study about?

All children with DCD find some motor tasks or situations hard to cope with. They often struggle in class to write fast enough to keep up with what the other students are doing because they can't go so quickly or they just find it hard to write neatly or play games and sport confidently? It could also mean that they can feel low in self esteem and that they experience situations which are awkward to deal with. They may struggle to make friends and this can make them feel very alone. Usually, parents/guardians and teachers like to find ways to help but no one really knows what is the best way to help. In the future it may be possible to find out what types of therapy is most helpful to children with DCD. Parenting a child with DCD can be very stressful. This study is about trying to find out if a particular therapy can help the children to make the best of their potential in motor skills, emotions, class work performance, handwriting and self esteem. As a result it could mean that the children would feel better about themselves. Even if you or you child don't have a stressful time coping with DCD then you can still take part in the study.

What will happen in the study?

30 children will be taking part in this study. Half of them will receive gentle fascia Bowen(fB) treatment and the other half will receive a hand and foot massage. Both of these treatments will take one hour or less. The children who do not receive fB at first will be offered free fascia Bowen treatments after the study has ended. The reason for doing this study is to investigate, using rigorous scientific methods, fascia Bowen therapy and any impact it has on children with DCD. We want to see whether it improves their motor coordination function, their ability to concentrate on their school work in class, writing, making friends and playing games.

What is Fascia Bowen

Bowen is a very light touch therapy where the therapist performs a series of gentle rolling movements over skin tissue at specific points on the body. e.g. hands, feet, back, legs. The aim is to stimulate the body to make its own adjustments in structural integrity which could result in better functioning, and hence improved health. Often the person receiving the therapy becomes so relaxed that they fall asleep.

Why have I been invited to take part in the study?

You have been invited to participate because you are the parent /guardian of a child aged 8-11 with a diagnosis of DCD, or who was assessed by occupational therapy and found to score at or below the 15th centile on the Movement ABC. We are hoping to recruit 30 children to take part in the study.

Do I have to take part?

Participation in this study is voluntary: it is up to you whether or not you choose to take part. You may change your mind at any time without having to give any reason. Your decision will be confidential as will all the information we gather or what you say. We will not be contacting your GP or telling your school about your personal information.

What will my child and I have to do?

This study will take place at school over a period of 8 weeks or so, but the child will need permission to be absent from class for a maximum of 1 hour per week. If it is not possible for him to be seen in school time then it will be at a non- NHS therapy centre or at home but schools have been chosen for convenience so that there is no extra cost implication driving to alternative centres.

The child will not need to remove any clothing but he will be asked to lie on a therapy treatment couch to receive the therapy, first while lying on his tummy and then while lying on his back.

In the 1st session and the 8th session an Occupational Therapist(OT) will come to the school, to the child's home or to a therapy centre to assess the child's motor skills. This will involve some jumping and ball throwing tasks. The child will give his decision about whether he wants to take part before the OT does any assessment. If the child agrees to take part the OT will help the child to complete some questionnaires about himself, about school work and about his social interaction at home and in school.

During the first week and the last week of the study a University of Reading research placement student will contact parents/guardians to complete some questionnaires about the child's motor function skills, social interaction and self esteem. In week 1 and 8 the teacher or staff member who works most with the child will also complete a questionnaire.

In between the two assessment sessions each child will receive one hour or less session of either Fascia Bowen therapy or a hand and foot massage per week for a total of 6 sessions. In the event of a child being ill or absent from school, the child will continue with the next scheduled session at the next available time i.e. each participant will receive 6 sessions, but this may be over 7 or more weeks.

Will the information I give be confidential.

All the information you give me will be confidential. We will use an identification number rather than your name or your child's name to label the information. It is possible that something you say during an interview might be quoted in a publication or thesis but this will be anonymous and you don't have to consent to being quoted if you would prefer not to be. Any electronic data that is gathered will be stored on an encrypted, password protected computer drive which only my supervisors and myself will have access. We will store paper copies of the information in a locked cabinet, to which only my supervisors or myself will have access. All personal information will be destroyed after a period of 5 years from the end of the project. The only time when we might have to tell someone about something you or the child have said or done will be if we feel that you or the child are at risk of harm.

Who has reviewed the study?

The University Of Bath has strict rules about what researchers are and are not allowed to do. This is to protect the rights and safety of the people who volunteer to take part in the research. This study has been approved by the University Ethics Committee, and allowed to proceed. This means that they are satisfied that the study will not harm you or the child in any way. Everyone involved with this study has also been checked by The Disclosure and Barring Service (DBS) to make sure that they have no criminal record and are allowed to work with children. The Headteacher of your child's school will be given a copy of the Disclosure and Barring certificate for each practitioner who will be in contact with your child if you decide to take part in the study. You may request to see this certificate from your Headteacher or from myself at any point during the study. If you would like to see the DBS certificate before you decide to take part in the study please contact me by email on melmj@btinternet.com or by telephone on 01488 648741.

What if something goes wrong?

If you have any questions or concerns at all about anything related to the study, please contact me by email on melmj@btinternet.com or by telephone on 01488 648741. You can also contact my supervisors by email, Dr. Knott (f.j.knott@reading.ac.uk) or Dr. Ashwin (c.ashwin@bath.ac.uk). All practitioners involved will have professional indemnity insurance regarding any compensation issues.

How can I find out more about the study.

You are welcome to contact me by telephone or email using the information provided below at any point to ask any questions that you may have about this study.

What do I have to do next?

If you would like to take part in this study, please read through the child information sheet with your child and help him to decide whether or not to take part. If you both decide you want to take part, either return the reply-slip included in this information pack or contact me by email or phone.

Thank you.

Melanie Morgan-Jones

email: melmj@btinternet.com

Phone: 01488 648741

Supervisors:

Dr. Fiona Knott f.j.knott@reading.ac.uk

Dr Chris Ashwin c.ashwin@bath.ac.uk

Appendix3 - Information sheet for children (participants)

Information sheet for the study into neuromuscular function and psychological well-being in boys with Developmental coordination disorder(DCD) or Dyspraxia.

Hello!

My name is Melanie and I would like you to help me with some research. Research is a way of trying to find answers to questions. I want to find out how you feel after having some therapy each week for 6 weeks. I also want to find out how you feel about school, home , class work and playing. Please read this letter and talk to your mum or dad about helping you choose whether you want to join in.

Why have I been asked to take part?

You have been chosen because you have DCD and this is the first time we have asked anyone to help with research about Fascia Bowen therapy.

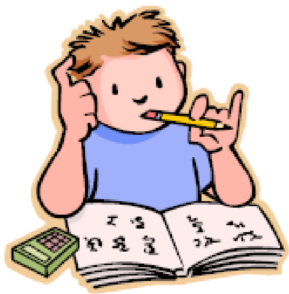
What is the research about?

I want to find out about how you do your school work after having the therapy, how you feel about yourself, how you feel that you behave at school and at home.

Has anyone checked that this study is OK to do?

Before any research is allowed to be done, it is checked by lots of people to make sure it is fair and safe. This project has been checked by lots of people at the University of Bath to make sure that they are happy with it and that it can go ahead.

What will happen if I choose to take part?



In visit 1 and visit 8 an occupational therapist (OT) will visit you at school or at another place agreed with your parents first. If you are happy to take part then you can tell the OT. This is called 'giving your assent'. She or he will ask you questions from a questionnaire about you and your feelings about certain things. It should be fun. She will ask you to do a few little games like throwing a ball and jumping.

Visit 1 and 8

Visit 2, 3, 4, 5, 6, and 7

You will have 6 sessions of treatment either while you are at school of if you can't come to school then at a place agreed with your parents. Your teacher will know that you are having a treatment and the school will have given their permission. The reason for doing this is to learn if you can start to do anything differently. You will need to lie on a couch and a lady will give you some massage treatment for half an hour.

Will anything in the research upset me?

I would like you to talk about how having DCD makes you feel and whether it makes you feel low or upset. If you don't want to talk about it then that will be OK. There isn't anything scary and there will be plenty of people who can help you. You will be asked to answer some questions by an Occupational therapist and you won't have to do anything you don't want to.

Will the things I say and do be kept private

I won't tell any of your friends, teachers or parents about what you say to me, unless you want me to. If I think you are in danger of getting hurt then I will have to tell your parents or somebody else so that they can keep you safe.

What if I don't want to take part?

That's OK; you can choose whether you join in or not. Tell your mum or dad what you want to do and they will let me know. If you change your mind once you have joined in then you will be allowed to stop straight away and nobody will be cross with you if you decided to stop.

Who can I talk to about whether I want to take part?

You should talk to your mum or dad before you decide. You can also ask me any questions you might have when I meet you

Thank you for reading this.  **Please ask any questions if you want to.**

Appendix 4 - Consent form

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University of Bath, Department of Health

Consent form

Project Title: "Does Fascia Bowen therapy improve neuromuscular function and psychological well-being in males aged 8-11(at primary school) diagnosed with DCD?"

I understand that participation in this study is entirely voluntary and I can withdraw from the study at any time without giving a reason. ☐

I have been given information about the research and what it involves, and I am happy to take part. ☐

I understand that all my personal details will be kept confidential. ☐

I confirm that I have been given the opportunity to ask questions. ☐

Name of Participant/Parent/guardian	Date	Signature
Name of Researcher (Print)	Date	Signature
Name of child (Print)		

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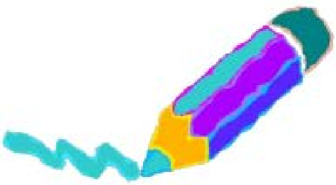
Appendix 5 Developmental Coordination Disorder Questionnaire (DCDQ)

THE DEVELOPMENTAL COORDINATION DISORDER QUESTIONNAIRE 2007© (DCDQ'07)

www.dcdq.ca



B.N. Wilson, M.Sc., OT(C) and S.G. Crawford, M.Sc.
Calgary, Alberta, Canada

BN Wilson 2007©

March 2012

We gratefully acknowledge the financial support of the Alberta Children's Hospital Foundation and the Alberta Center for Child, Family and Community Research

Wilson, B.N., Crawford, S.G., Green, D., Roberts, G., Aylott, A., & Kaplan, B. (2009). Psychometric Properties of the Revised Developmental Coordination Disorder Questionnaire. *Physical & Occupational Therapy in Pediatrics,* *29(2):182–202.*

Coordination Questionnaire (Revised 2007)

	Year	Mon	Day
Today's Date:			
Child's Birth:			
Child's Age:			

Name of Child: ____________________

Person completing Questionnaire: ____________________

Relationship to child: ____________________

Most of the motor skills that this questionnaire asks about are things that your child does with his or her hands, or when moving.
A child's coordination may improve each year as they grow and develop. For this reason, it will be easier for you to answer the questions if you think about other children that you know who *are the same age as your child*.
Please compare the degree of coordination your child has with other children of the same age when answering the questions.
Circle the one number that best describes your child. If you change your answer and want to circle another number, please circle the correct response twice.
If you are unclear about the meaning of a question, or about how you would answer a question to best describe your child, please call____________________at ____________________for assistance.

Not at all like your child	A bit like your child	Moderately like your child	Quite a bit like your Child	Extremely like your child
1	2	3	4	5

1. Your child *throws a ball* in a controlled and accurate fashion.

   1 2 3 4 5

2. Your child *catches* a small *ball* (e.g., tennis ball size) thrown from a distance of 6 to 8 feet (1.8 to 2.4 meters).

   1 2 3 4 5

3. Your child *hits* an approaching *ball* or *birdie* with a bat or racquet accurately.

   1 2 3 4 5

4. Your child *jumps* easily *over* obstacles found in garden or play environment.

   1 2 3 4 5

5. Your child *runs* as fast and in a *similar* way to other children of the same gender and age.

   1 2 3 4 5

6. If your child has a *plan* to do a motor *activity*, he/she can organize his/her body to follow the plan and effectively complete the task (e.g., building a cardboard or cushion "fort," moving on playground equipment, building a house or a structure with blocks, or using craft materials).

   1 2 3 4 5 **(OVER)**

	Not at all like your child 1	A bit like your child 2	Moderately like your child 3	Quite a bit like your Child 4	Extremely like your child 5

7. Your child's printing or *writing* or drawing in class is *fast* enough to keep up with the rest of the children in the class.

1 2 3 4 5

8. Your child's printing or *writing* letters, numbers and words is *legible*, precise and accurate or, if your child is not yet printing, he or she *colors and draws* in a coordinated way and makes pictures that you can recognize.

1 2 3 4 5

9. Your child uses appropriate *effort* or tension when printing or writing or drawing (no excessive *pressure* or tightness of grasp on the pencil, writing is not too heavy or dark, or too light).

1 2 3 4 5

10. Your child *cuts* out pictures and *shapes* accurately and easily.

1 2 3 4 5

11. Your child is interested in and *likes* participating in *sports or active* games requiring good motor skills.

1 2 3 4 5

12. Your child learns *new motor tasks* (e.g., swimming, rollerblading) easily and does not require more practice or time than other children to achieve the same level of skill.

1 2 3 4 5

13. Your child is *quick and competent* in tidying up, putting on shoes, tying shoes, dressing, etc.

1 2 3 4 5

14. Your child would *never* be described as a *"bull in a china shop"* (that is, appears so clumsy that he or she might break fragile things in a small room).

1 2 3 4 5

15. Your child does *not fatigue easily* or appear to slouch and "fall out" of the chair if required to sit for long periods.

1 2 3 4 5

Thank you.

COORDINATION QUESTIONNAIRE (DCDQ'07): SCORE SHEET

Name: ______________________ **Date:** ______________

Birth Date: ______________________ **Age:** ______________

	Control During Movement	Fine Motor/ Handwriting	General Coordination
1. Throws ball			
2. Catches ball			
3. Hits ball/birdie			
4. Jumps over			
5. Runs			
6. Plans activity			
7. Writing fast			
8. Writing legibly			
9. Effort and pressure			
10. Cuts			
11. Likes sports			
12. Learning new skills			
13. Quick and competent			
14. "Bull in shop"			
15. Does not fatigue			

TOTAL ______ / 30 Control during Movement + ______ / 20 Fine Motor/ Handwriting + ______ / 25 General Coordination = ______ / 75 **TOTAL**

For Children Ages 5 years 0 months to 7 years 11 months
- 15-46 indication of DCD or suspect DCD
- 47-75 probably not DCD

For Children Ages 8 years 0 months to 9 years 11 months
- 15-55 indication of DCD or suspect DCD
- 56-75 probably not DCD

For Children Ages 10 years 0 months to 15 years
- 15-57 indication of DCD or suspect DCD
- 58-75 probably not DCD

 www.dcdq.ca

Appendix 6 - Motor Assessment Battery for Children -2 (MABC-2)

Product Description reproduced with acknowledgement to Pearson Clinical.

Key complementary features of the Movement ABC-2

The *Movement ABC* and *Movement ABC, Second Edition* are two of the most frequently used tests of motor impairment in the world; featuring in over 500 research studies internationally it has been translated and standardised in several countries.

Movement ABC-2:

- Identifies delay or impairment in motor development
- Plans intervention
- Measures change
- Utilised in research worldwide

UK Standardisation

The *Movement ABC-2* test and checklist were normed on a nationally stratified sample in 2006. The test is normed on over 1000 children and the checklist on 400 children. Excellent reliability and validity data plus studies with clinical populations are included.

The Movement ABC-2 test

The test contains 8 tasks for each of 3 age ranges: 3 – 6 years; 7 – 10 years and 11 – 16 years. The tasks cover the following 3 areas:

- Manual Dexterity
- Ball Skills
- Static and Dynamic Balance.

Total standard scores and percentiles are available. A profile of a child's performance over the different sections of the test can be examined.
The assessment is paralleled by an observational approach to perceptual-motor aspects and emotional and motivational difficulties the child may have in relation to motor tasks.

Appendix 7 - Scholastic Function Questionnaire

Please consider the behaviour and function of the child within the last two weeks during lesson times.

Child's name: ....

Class: ....

School : ....

Name of Person completing the form. ....

Date completed: ....

Key

1	2	3	4	5
Very Poor	Poor	Barely acceptable	Good	Very Good

Please tick the appropriate box using a black biro/ink pen

Attention - How well have they focused in lessons within the last two weeks?

1	2	3	4	5

Concentration span- How long have they concentrated during the lessons in the last two weeks?

1	2	3	4	5

Work completion rate- How quickly have they been completing their work in the last two weeks?

1	2	3	4	5

Handwriting quality- How is their writing quality in the last two weeks.

1	2	3	4	5

Appendix 8 - Spence Social Skills Questionnaire(pupils)SSQ- Pu

SOCIAL SKILLS QUESTIONNAIRE (PUPILS)

YOUR DATE OF BIRTH: CLASS SCHOOL:

DATE: AGE: SEX:

Please put a circle around the rating which best describes you over the past 4 weeks. Please answer all questions.

1. I listen to other people's point of view during arguments	not true	sometimes true	mostly true
2. I make requests from my parents in a polite way	not true	sometimes true	mostly true
3. I control my temper when I lose in a game or competition	not true	sometimes true	mostly true
4. I control my temper if other kids tease me or say unkind things	not true	sometimes true	mostly true
5. I ask other kids in a nice way if I want to join in their activities	not true	sometimes true	mostly true
6. I show other people if I feel affectionate or good towards them	not true	sometimes true	mostly true
7. I do kind things for other people without having to be asked	not true	sometimes true	mostly true
8. I say nice things to others when they deserve it	not true	sometimes true	mostly true
9. I control my temper when I am told off or criticized by parents	not true	sometimes true	mostly true
10. I ask permission before I borrow or use other people's things	not true	sometimes true	mostly true
11. I share things with other kids	not true	sometimes true	mostly true
12. I control my temper during disagreements with other kids	not true	sometimes true	mostly true
13. I ask other kids if I can join in their activities	not true	sometimes true	mostly true
14. The expression on my face is usually right (not always angry or grinning)	not true	sometimes true	mostly true
15. I say I am sorry when I do something wrong	not true	sometimes true	mostly true
16. I join in family activities	not true	sometimes true	mostly true
17. I invite other kids to join in my games or activities	not true	sometimes true	mostly true
18. I tell a parent or teacher if I have a problem or need help	not true	sometimes true	mostly true
19. I show that I am worried or that I care if someone is hurt	not true	sometimes true	mostly true

or upset

20. I follow the rules in games or sports	not true	sometimes true	mostly true
21. I take part in games and activities with other kids	not true	sometimes true	mostly true
22. I have conversations with adults	not true	sometimes true	mostly true
23. I look people in the eye when we are talking	not true	sometimes true	mostly true
24. My voice usually sounds friendly (not aggressive or unusual)	not true	sometimes true	mostly true
25. I control my temper when I do not get my own way with my parents or teachers	not true	sometimes true	mostly true
26. I laugh or smile when I am happy or hear funny things	not true	sometimes true	mostly true
27. I have conversations with other kids	not true	sometimes true	mostly true
28. I show other people that I am listening when we are talking	not true	sometimes true	mostly true
29. I can show people when I am angry without losing my temper	not true	sometimes true	mostly true
30. I stand up for myself if other kids behave badly towards me without losing my temper	not true	sometimes true	mostly true

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Appendix 9 - Spence Social Skills Questionnaire(Parents) SSQ-P.

SOCIAL SKILLS QUESTIONNAIRE (PARENTS).

DATE: YOUNG PERSON'S NAME: HIS/HER SEX:

GRADE: SCHOOL: HIS/HER AGE:

NAME OF PARENT COMPLETING THE FORM:

Please put a circle around the rating which best describes the young person over the past 4 weeks. Please circle the **0 if the item is not true of him/her**. Circle the number **1 if the item is sometimes true**. If the item is **mostly true of him/her then circle the number 2**. Please answer all items.

0=not true, 1=sometimes true, 2= mostly true

1. Listens to other people's points of view during arguments	0	1	2
2. Makes requests from parents in a polite way	0	1	2
3. Controls his/her temper when he/she loses in a game or competition	0	1	2
4. Reacts appropriately if other kids tease him/her or say unkind things	0	1	2
5. Asks to join in activities with other kids in an appropriate manner	0	1	2
6. Expresses affection or positive feelings to others	0	1	2
7. Does kind things for others voluntarily	0	1	2
8. Gives compliments or says nice things to others when appropriate	0	1	2
9. Controls his/her temper when told off or criticized by parents	0	1	2
10. Asks permission before borrowing or using other people's things	0	1	2
11. Shares things with other kids his/her age	0	1	2
12. Controls his/her temper during disagreements with other kids	0	1	2
13. Asks other kids if he/she may join in their activities	0	1	2
14. Has an appropriate facial expression (eg. not excessive grinning or aggressive)	0	1	2
15. Apologizes when he/she does something wrong	0	1	2

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16. Joins in family activities	0	1	2
17. Invites others to join in games or activities	0	1	2
18. Tells a parent if he/she has a problem or needs help	0	1	2
19. Expresses sympathy or concern to others who are hurt or upset	0	1	2
20. Follows the rules in games or activities	0	1	2
21. Takes part in social or sporting activities with other youngsters	0	1	2
22. Takes part in conversations with adults	0	1	2
23. Makes eye contact appropriately with others during conversations	0	1	2
24. His/her tone of voice is appropriate (eg. not aggressive or unusual)	0	1	2
25. Controls his/her temper when he/she does not get his/her own way with parents	0	1	2
26. Laughs or smiles when appropriate	0	1	2
27. Takes part in conversations with other kids	0	1	2
28. Shows that he/she is listening to others during conversations	0	1	2
29. Can express his/her feelings of anger but without losing his/her temper	0	1	2
30. Stands up for him/herself appropriately if other kids act unreasonably	0	1	2

Appendix 10 - Spence Social Skills Questionnaire (Teachers) - SSQ-T .

SOCIAL SKILLS QUESTIONNAIRE (TEACHERS).

DATE: PUPIL'S NAME: PUPIL'S SEX:

CLASS:- SCHOOL: PUPIL'S AGE:

TEACHER'S NAME OR INITIAL:

Please put a circle around the rating which best describes this pupil over the past 4weeks. Please circle the **0 if the item is not true**. Circle the number **1 if the item is sometimes true**. If the item is **mostly true, then circle the number 2**. Please answer all items.

0=not true, 1=sometimes true, 2= mostly true

1. Listens to other people's points of view during arguments	0	1	2
2. Makes requests from teachers in a polite way	0	1	2
3. Controls his/her temper when he/she loses in a game or competition	0	1	2
4. Reacts appropriately if peers tease him/her or say unkind things	0	1	2
5. Asks to join in activities with peers in an appropriate manner	0	1	2
6. Expresses affection or positive feelings to others	0	1	2
7. Does kind things for others voluntarily	0	1	2
8. Gives compliments or says nice things to others when appropriate	0	1	2
9. Controls his/her temper when told off or criticized by teachers	0	1	2
10. Asks permission before borrowing or using other people's things	0	1	2
11. Shares things with peers	0	1	2
12. Controls his/her temper during disagreements with peers	0	1	2
13. Asks peers if he/she may join in their activities	0	1	2
14. Has an appropriate facial expression (eg. not excessive grinning or aggressive)	0	1	2
15. Apologizes when he/she does something wrong	0	1	2
16. Spends free time in the company of peers	0	1	2

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17. Invites others to join in games or activities	0	1	2
18. Tells a teacher if he/she has a problem or needs help	0	1	2
19. Expresses sympathy or concern to others who are hurt or upset	0	1	2
20. Follows the rules in games or sports activities	0	1	2
21. Takes part in games and activities with peers	0	1	2
22. Takes part in conversations with adults	0	1	2
23. Makes eye contact appropriately with others during conversations	0	1	2
24. His/her tone of voice is appropriate (eg. not aggressive or unusual)	0	1	2
25. Controls his/her temper when he/she does not get his/her own way with teachers	0	1	2
26. Laughs or smiles when appropriate	0	1	2
27. Takes part in conversations with peers	0	1	2
28. Shows that he/she is listening to others during conversations	0	1	2
29. Can express his/her feelings of anger but without losing his/her temper	0	1	2
30. Stands up for him/herself appropriately if peers act unreasonably	0	1	2

Appendix 11 - Self Perception Profile For Children: Questionnaire (SPP); Child version.

Individual Profile Form

SELF-PERCEPTION PROFILE FOR CHILDREN

(GRADES 3 – 8)

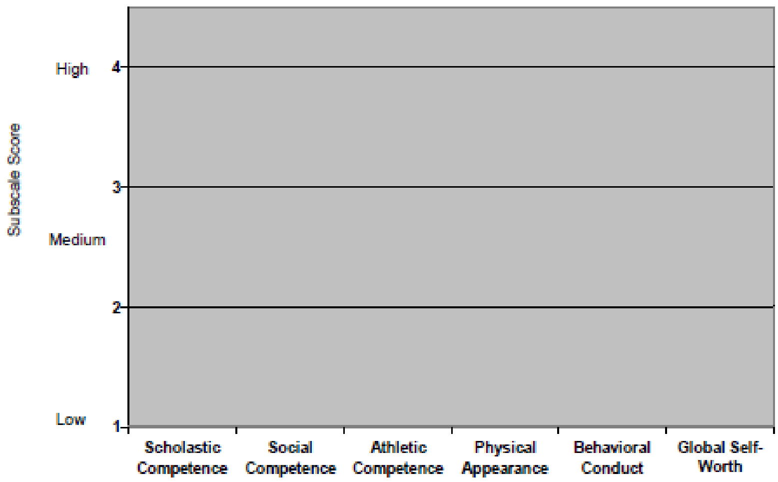
(Revision of the Self-Perception Profile for Children; Harter, 1985)

Susan Harter, Ph.D., University of Denver, 2012

Name: Grade: Age: Gender:

Student Rating Teacher Rating

Date:



Name____Age__________

How Important Are These Things to How You Feel about Yourself as a Person?

	Really True for me	Sort of True for me				Sort of True for me	Really True for me
1.	☐	☐	Some kids think it is important to do well at school work in order to feel good as a person	**BUT**	Other kids **don't** think how well they do at school work is that important	☐	☐
2.	☐	☐	Some kids *don't* think that making a lot of friends is all that important	**BUT**	Other kids think that making a lot of friends is important to how they feel as a person	☐	☐
3.	☐	☐	Some kids think it's important to be good at sports to like oneself as a person	**BUT**	Other kids *don't* think how good you are at sports is that important	☐	☐
4.	☐	☐	Some kids think it's important to be good looking in order to feel good about themselves	**BUT**	Other kids *don't* think that being good looking is very important at all	☐	☐
5.	☐	☐	Some kids think that it's important to behave the way they should	**BUT**	Other kids *don't* think that how they behave is that important to liking oneself overall	☐	☐
6.	☐	☐	Some kids *don't* think that getting good grades is all that important to how they feel about themselves	**BUT**	Other kids think that getting good grades is important	☐	☐
7.	☐	☐	Some kids think it's important to be popular	**BUT**	Other kids *don't* think that being popular is all that important to how they feel about themselves	☐	☐
8.	☐	☐	Some kids *don't* think doing well at athletics is that important to how they feel about themselves as a person	**BUT**	Other kids feel that doing well at athletics is important	☐	☐
9.	☐	☐	Some kids *don't* think that how they look is important to how they feel about themselves as a person	**BUT**	Other kids think that how they look is important	☐	☐
10.	☐	☐	Some kids *don't* think that how they act is all that important	**BUT**	Other kids think it's important to act the way you are supposed to, in order to like oneself	☐	☐

Appendix 12 - - Self Perception Profile For Children: Questionnaire (SPP); Teacher version.

Teacher's Rating Scale of Child's Actual Behavior

(Parallels the Self-Perception Profile for Children)

Child's Name_______________________ Child's Grade_____ Rater _____________

For each child, please indicate what you feel to be his/her actual competence on each question, in your opinion. First decide what kind of child he or she is like—the one described on the left or right—then indicate whether this is just sort of true or really true for that individual. Thus, for each item, check one of four boxes.

	Really True	Sort of True				Sort of True	Really True
1.	☐	☐	This child is really good at his/her school work	OR	This child can't do the school work assigned	☐	☐
2.	☐	☐	This child finds it hard to make friends	OR	For this child it's pretty easy	☐	☐
3.	☐	☐	This child does really well at all kinds of sports	OR	This child isn't very good when it comes to sports	☐	☐
4.	☐	☐	This child is good looking	OR	This child is not very good looking	☐	☐
5.	☐	☐	This child is usually well-behaved	OR	This child is often not well-behaved	☐	☐
6.	☐	☐	This child often forgets what (s)he learns	OR	This child can remember things easily	☐	☐
7.	☐	☐	This child has social skills to make friends	OR	This child doesn't have social skills to make friends	☐	☐
8.	☐	☐	This child is better than others his/her age at sports	OR	This child can't play as well	☐	☐
9.	☐	☐	This child has a nice physical appearance	OR	This child doesn't have such a nice physical appearance	☐	☐
10.	☐	☐	This child usually acts appropriately	OR	This child would be better if (s)he acted differently	☐	☐
11.	☐	☐	This child has trouble figuring out the answers in school	OR	This child almost always can figure out the answers	☐	☐
12.	☐	☐	This child knows how to become popular	OR	This child does not know how to become popular	☐	☐
13.	☐	☐	This child doesn't do well at new outdoor games	OR	This child is good at new games right away	☐	☐
14.	☐	☐	This child isn't very good looking	OR	This child is pretty good looking	☐	☐
15.	☐	☐	This child often gets in trouble because of things (s)he does	OR	This child usually doesn't do things that get him/her in trouble	☐	☐

Appendix 13 - The Strengths and Difficulties Questionnaire (SDQ).

Strengths and Difficulties Questionnaire

For each item, please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not absolutely certain or the item seems daft! Please give your answers on the basis of the child's behaviour over the last six months or this school year.

Child's Name .... Male/Female

Date of Birth..

	Not True	Somewhat True	Certainly True
Considerate of other people's feelings	☐	☐	☐
Restless, overactive, cannot stay still for long	☐	☐	☐
Often complains of headaches, stomach-aches or sickness	☐	☐	☐
Shares readily with other children (treats, toys, pencils etc.)	☐	☐	☐
Often has temper tantrums or hot tempers	☐	☐	☐
Rather solitary, tends to play alone	☐	☐	☐
Generally obedient, usually does what adults request	☐	☐	☐
Many worries, often seems worried	☐	☐	☐
Helpful if someone is hurt, upset or feeling ill	☐	☐	☐
Constantly fidgeting or squirming	☐	☐	☐
Has at least one good friend	☐	☐	☐
Often fights with other children or bullies them	☐	☐	☐
Often unhappy, down-hearted or tearful	☐	☐	☐
Generally liked by other children	☐	☐	☐
Easily distracted, concentration wanders	☐	☐	☐
Nervous or clingy in new situations, easily loses confidence	☐	☐	☐
Kind to younger children	☐	☐	☐
Often lies or cheats	☐	☐	☐
Picked on or bullied by other children	☐	☐	☐
Often volunteers to help others (parents, teachers, other children)	☐	☐	☐
Thinks things out before acting	☐	☐	☐
Steals from home, school or elsewhere	☐	☐	☐
Gets on better with adults than with other children	☐	☐	☐
Many fears, easily scared	☐	☐	☐
Sees tasks through to the end, good attention span	☐	☐	☐

Signature .... Date ....

Parent/Teacher/Other (please specify:)

Thank you very much for your help

Scoring the Informant-Rated Strengths and Difficulties Questionnaire

The 25 items in the SDQ comprise 5 scales of 5 items each. It is usually easiest to score all 5 scales first before working out the total difficulties score. Somewhat True is always scored as 1, but the scoring of Not True and Certainly True varies with the item, as shown below scale by scale. For each of the 5 scales the score can range from 0 to 10 if all 5 items were completed. Scale score can be prorated if at least 3 items were completed.

Emotional Symptoms Scale	Not True	Somewhat True	Certainly True
Often complains of headaches, stomach-aches ...	0	1	2
Many worries, often seems worried	0	1	2
Often unhappy, downhearted or tearful	0	1	2
Nervous or clingy in new situations ...	0	1	2
Many fears, easily scared	0	1	2

Conduct Problems Scale	Not True	Somewhat True	Certainly True
Often has temper tantrums or hot tempers	0	1	2
Generally obedient, usually does what ...	2	1	0
Often fights with other children or bullies them	0	1	2
Often lies or cheats	0	1	2
Steals from home, school or elsewhere	0	1	2

Hyperactivity Scale	Not True	Somewhat True	Certainly True
Restless, overactive, cannot stay still for long	0	1	2
Constantly fidgeting or squirming	0	1	2
Easily distracted, concentration wanders	0	1	2
Thinks things out before acting	2	1	0
Sees tasks through to the end, good attention span	2	1	0

Peer Problems Scale	Not True	Somewhat True	Certainly True
Rather solitary, tends to play alone	0	1	2
Has at least one good friend	2	1	0
Generally liked by other children	2	1	0
Picked on or bullied by other children	0	1	2
Gets on better with adults than with other children	0	1	2

Prosocial Scale	Not True	Somewhat True	Certainly True
Considerate of other people's feelings	0	1	2
Shares readily with other children	0	1	2
Helpful if someone is hurt, upset of feeling ill	0	1	2
Kind to younger children	0	1	2
Often volunteers to help others	0	1	2

The Total Difficulties Score:

is generated by summing the scores from all the scales except the prosocial scale. The resultant score can range from 0 to 40 (and is counted as missing if one of the component scores is missing).

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Interpreting Symptom Scores and Defining "Caseness" from Symptom Scores

Although SDQ scores can often be used as continuous variables, it is sometimes convenient to classify scores as normal, borderline and abnormal. Using the bandings shown below, an abnormal score on one or both of the total difficulties scores can be used to identify likely "cases" with mental health disorders. This is clearly only a rough-and ready method for detecting disorders – combining information from SDQ symptom and impact scores from multiple informants is better, but still far from perfect. Approximately 10% of a community sample scores in the abnormal band on any given score, with a further 10% scoring in the borderline band. The exact proportions vary according to country, age and gender – normative SDQ data are available from the web site. You may want to adjust banding and caseness criteria for these characteristics, setting the threshold higher when avoiding false positives is of paramount importance, and setting the threshold lower when avoiding false negatives is more important.

	Normal	Borderline	Abnormal
Parent Completed			
Total Difficulties Score	0 - 13	14 - 16	17 - 40
Emotional Symptoms Score	0 - 3	4	5 - 10
Conduct Problems Score	0 - 2	3	4 - 10
Hyperactivity Score	0 - 5	6	7 - 10
Peer Problems Score	0 - 2	3	4 - 10
Prosocial Behaviour Score	6 - 10	5	0 - 4
Teacher Completed			
Total Difficulties Score	0 - 11	12 - 15	16 - 40
Emotional Symptoms Score	0 - 4	5	6 - 10
Conduct Problems Score	0 - 2	3	4 - 10
Hyperactivity Score	0 - 5	6	7 - 10
Peer Problems Score	0 - 3	4	5 - 10
Prosocial Behaviour Score	6 - 10	5	0 - 4

Generating and Interpreting Impact Scores

When using a version of the SDQ that includes an "Impact Supplement", the items on overall distress and social impairment can be summed to generate an impact score that ranges from 0 to 10 for the parent-completed version and from 0-6 for the teacher-completed version.

	Not at all	Only a little	Quite a lot	A great deal
Parent report				
Difficulties upset or distress child	0	0	1	2
Interfere with HOME LIFE	0	0	1	2
Interfere with FRIENDSHIPS	0	0	1	2
Interfere with CLASSROOM LEARNING	0	0	1	2
Interfere with LEISURE ACTIVITIES	0	0	1	2
Teacher report				
Difficulties upset or distress child	0	0	1	2
Interfere with PEER RELATIONSHIPS	0	0	1	2
Interfere with CLASSROOM LEARNING	0	0	1	2

Responses to the questions on chronicity and burden to others are not included in the impact score. When respondents have answered "no" to the first question on the impact supplement (i.e. when they do not perceive the child as having any emotional or behavioural difficulties), they are not asked to complete the questions on resultant distress or impairment; the impact score is automatically scored zero in these circumstances.

Although the impact scores can be used as continuous variables, it is sometimes convenient to classify them as normal, borderline or abnormal: a total impact score of 2 or more is abnormal; a score of 1 is borderline; and a score of 0 is normal.

End of Appendices

APPENDIX 5 -

ETHICS – AMENDMENT DOCUMENT

Ethics reference number 13-131.

To the Chairman and members of the Psychology ethics committee .

Please would you consider the following amendments to the above ethics application reference?

I would like to include Hampshire and Cardiff to the locations already approved previously. All the procedures laid out in the original ethics application will remain the same at the new locations. Schools and private clinics would be utilised as in the original application which was approved.

In addition to the above I would like to introduce a commonly utilised questionnaire which screens for co-morbidity as this will be an issue with children who have Dyspraxia/DCD (developmental coordination disorder) but it is an area which is under- researched. The questionnaire, called the Social Communication Questionnaire (SCQ) by Michael Rutter, M.D., FRS, Anthony Bailey, M.D., and Catherine Lord, Ph.D., is a 40-item, parent-report screening measure that taps the symptomatology associated with Autism spectrum disorder(ASD). The items are administered in a yes/no response format which can be completed by the parent in less than 10minutes and scored by the administrator in 5 minutes. Its completion will refer to the individual's entire developmental history and the results produced are pertinent to referral for a more complete diagnostic workup. The inclusion of this questionnaire will not add any ethical implications.

Yours sincerely,
Melanie Morgan-Jones PD Health student.
23/09/13

APPENDIX 6 -

ETHICS – AMENDMENT APPROVAL DOCUMENT

-----Original Message-----
From: Psychology-Ethics [mailto:psychology-ethics@bath.ac.uk]
Sent: 23 September 2013 16:16
To: Melanie Morgan-Jones
Subject: Re: Ethics amendment document September '13 reference 13-131

Dear Melanie Morgan-Jones,

Reference Number 13-131

Thank you for passing along the information about the requested amendments to your research. I have now reviewed these and determine there are no additional ethical considerations for them, and am taking Chairs Action to approve them for your study.

Best wishes with your research.

Dept of Psychology Ethics Committee
University of Bath

On 23/09/2013 11:12, Melanie Morgan-Jones wrote:
> Dear Sir,
>
> Please find attached an application to amend my existing ethics submission.
>
> Yours sincerely,
>
> Melanie Morgan-Jones.
>
> PD Dept of Health, University of Bath.

APPENDIX 7 -

FINAL LETTER TO HEADTEACHERS WITH TREATMENT LOCATION OPTIONS

West Berkshire COUNCIL

Learning Support Team
West Berkshire Council
West Street House
West Street
Newbury RG14 1BZ

Our Ref: RI
Your Ref:

Please ask for:
Direct Line: 01635 503646
Fax:
e-mail: rireland@westberks.gov.uk

Dear Headteacher

I have been approached by a student from University of Bath, Melanie Morgan-Jones, who is undertaking her Doctorate. Her area of interest is children with Developmental Coordination Disorder (DCD) or those with motor difficulties. Her research question is about the benefits for motor skills, and psychological factors such as self-esteem, following an intervention called 'Fascia Bowen Therapy'. Her target group is males, aged 8-11 years who are either diagnosed with Developmental Coordination Disorder (DCD) or dyspraxia or who scored at the 15th centile or below on an assessment administered by an Occupational Therapist called MABC-2. Her supervisors are Dr Chris Ashwin at the University of Bath and Dr Fiona Knott at the University of Reading- who many of you will have heard of from her work in the West Berkshire area in CAMHs.

Her study would involve using the Fascia Bowen Therapy with a group of individuals and also having a control group. She is hoping to start this work in the Autumn Term 2013. The intervention can either be conducted in the school or in a private clinic. If the intervention takes place in school, then each participant will be seen for about an hour once a week during the school day. A small private room would be required. Children who take part in the study or as controls will be assessed in various ways, and a teacher or member of staff who works closely with the child will be asked to complete some short questionnaires.

If you think you may have children who meet her criteria and would be interested in being a part of this innovative study please could you contact me as soon as possible, I will pass on your details to Melanie.

Kind regards,

R. Lehal.

Rhian Ireland
Learning Support Services Manager

APPENDIX 8 -

CHILD INFORMATION SHEET

Information sheet for the study into neuromuscular function and psychological well-being in boys with Developmental coordination disorder(DCD) or Dyspraxia.

Hello!

My name is Melanie and I would like you to help me with some research. Research is a way of trying to find answers to questions. I want to find out how you feel after having some therapy each week for 6 weeks. I also want to find out how you feel about school, home , class work and playing. Please read this letter and talk to your mum or dad about helping you choose whether you want to join in.

Why have I been asked to take part?

You have been chosen because you have DCD and this is the first time we have asked anyone to help with research about Fascia Bowen therapy.

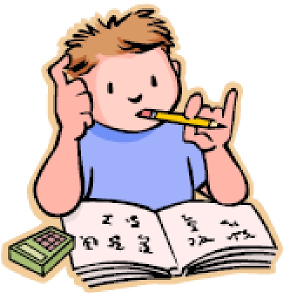
What is the research about?

I want to find out about how you do your school work after having the therapy, how you feel about yourself, how you feel that you behave at school and at home.

Has anyone checked that this study is OK to do?

Before any research is allowed to be done, it is checked by lots of people to make sure it is fair and safe. This project has been checked by lots of people at the University of Bath to make sure that they are happy with it and that it can go ahead.

What will happen if I choose to take part?



Visit 1 and 8

In visit 1 and visit 8 an occupational therapist (OT) will visit you at school or at another place agreed with your parents first. If you are happy to take part then you can tell the OT. This is called 'giving your assent'. She or he will ask you questions from a questionnaire about you and your feelings about certain things. It should be fun. She will ask you to do a few little games like throwing a ball and jumping.

Visit 2, 3, 4, 5, 6, and 7

You will have 6 sessions of treatment either while you are at school of if you can't come to school then at a place agreed with your parents. Your teacher will know that you are having a treatment and the school will have given their permission. The reason for doing this is to learn if you can start to do anything differently. You will need to lie on a couch and a lady will give you some massage treatment for half an hour.

Will anything in the research upset me?

I would like you to talk about how having DCD makes you feel and whether it makes you feel low or upset. If you don't want to talk about it then that will be OK. There isn't anything scary and there will be plenty of people who can help you. You will be asked to answer some questions by an Occupational therapist and you won't have to do anything you don't want to.

Will the things I say and do be kept private?

I won't tell any of your friends, teachers or parents about what you say to me, unless you want me to. If I think you are in danger of getting hurt then I will have to tell your parents or somebody else so that they can keep you safe.

What if I don't want to take part?

That's OK; you can choose whether you join in or not. Tell your mum or dad what you want to do and they will let me know. If you change your mind once you have joined in then you will be allowed to stop straight away and nobody will be cross with you if you decided to stop.

Who can I talk to about whether I want to take part?

You should talk to your mum or dad before you decide. You can also ask me any questions you might have when I meet you

Thank you for reading this.  **Please ask any questions if you want to.**

APPENDIX 9 -

PARENT INFORMATION SHEET

Does Fascia Bowen Therapy Improve Neuromuscular

Function and Psychological well-being in males aged 8-11(at primary school) diagnosed with DCD?

My name is Melanie Morgan-Jones; I am a Health Research Professional Doctorate student with the University of Bath, studying neuro muscular function improvements in children with Developmental coordination disorder (DCD)/ Dyspraxia. My supervisors are Dr. Fiona Knott and Dr. Chris Ashwin who are psychologists specializing in work with children. I would like to invite you, your child and a teacher at your child's school, to take part in this study. Before you decide, it is important that you understand why the research is being done and what it will involve for you. Please read the information on this sheet carefully before you make a decision. You will have an opportunity to ask questions which you may have before agreeing to participate by contacting me on the telephone number or email address provided. If you want to mention the study to your friends and family before you make your decision then please do.

What is the study about?

All children with DCD find some motor tasks or situations hard to cope with. They often struggle in class to write fast enough to keep up with what the other students are doing because they can't go so quickly or they just find it hard to write neatly or play games and sport confidently? It could also mean that they can feel low in self esteem and that they experience situations which are awkward to deal with. They may struggle to make friends and this can make them feel very alone. Usually, parents/guardians and teachers like to find ways to help but no one really knows what is the best way to help. In the future it may be possible to find out what types of therapy is most helpful to children with DCD. Parenting a child with DCD can be very stressful. This study is about trying to find out if a particular therapy can help the children to make the best of their potential in motor skills, emotions, class work performance, handwriting and self esteem. As a result it could mean that the children would feel better about themselves. Even if you or you child don't have a stressful time coping with DCD then you can still take part in the study.

What will happen in the study?

30 children will be taking part in this study. Half of them will receive gentle fascia Bowen(fB) treatment and the other half will receive a hand and foot massage. Both of these treatments will take one hour or less. The children who do not receive fB at first will be offered free fascia Bowen treatments after the study has ended. The reason for doing this study is to investigate, using rigorous scientific methods, fascia Bowen therapy and any impact it has on children with DCD. We want to see whether it improves their motor coordination function, their ability to concentrate on their school work in class, writing, making friends and playing games.

What is Fascia Bowen

Bowen is a very light touch therapy where the therapist performs a series of gentle rolling movements over skin tissue at specific points on the body. e.g. hands, feet, back, legs. The aim is to stimulate the body to make its own adjustments in structural integrity which could result in better functioning, and hence improved health. Often the person receiving the therapy becomes so relaxed that they fall asleep.

Why have I been invited to take part in the study?

You have been invited to participate because you are the parent /guardian of a child aged 8-11 with a diagnosis of DCD, or who was assessed by occupational therapy and found to score at or below the 15th centile on the Movement ABC. We are hoping to recruit 30 children to take part in the study.

Do I have to take part?

Participation in this study is voluntary: it is up to you whether or not you choose to take part. You may change your mind at any time without having to give any reason. Your decision will be confidential as will all the information we gather or what you say. We will not be contacting your GP or telling your school about your personal information.

What will my child and I have to do?

This study will take place at school over a period of 8 weeks or so, but the child will need permission to be absent from class for a maximum of 1 hour per week. If it is not possible for him to be seen in school time then it will be at a non- NHS therapy centre or at home but schools have been chosen for convenience so that there is no extra cost implication driving to alternative centres.

The child will not need to remove any clothing but he will be asked to lie on a therapy treatment couch to receive the therapy, first while lying on his tummy and then while lying on his back.

In the 1st session and the 8th session an Occupational Therapist(OT) will come to the school, to the child's home or to a therapy centre to assess the child's motor skills. This will involve some jumping and ball throwing tasks. The child will give his decision about whether he wants to take part before the OT does any assessment. If the child agrees to take part the OT will help the child to complete some questionnaires about himself, about school work and about his social interaction at home and in school.

During the first week and the last week of the study a University of Reading research placement student will contact parents/guardians to complete some questionnaires about the child's motor function skills, social interaction and self esteem. In week 1 and 8 the teacher or staff member who works most with the child will also complete a questionnaire.

In between the two assessment sessions each child will receive one hour or less session of either Fascia Bowen therapy or a hand and foot massage per week for a total of 6 sessions. In the event of a child being ill or absent from school, the child will continue with the next scheduled session at the next available time i.e. each participant will receive 6 sessions, but this may be over 7 or more weeks.

Will the information I give be confidential.

All the information you give me will be confidential. We will use an identification number rather than your name or your child's name to label the information. It is possible that something you say during an interview might be quoted in a publication or thesis but this will be anonymous and you don't have to consent to being quoted if you would prefer not to be. Any electronic data that is gathered will be stored on an encrypted, password protected computer drive which only my supervisors and myself will have access. We will store paper copies of the information in a locked cabinet, to which only my supervisors or myself will have access. All personal information will be destroyed after a period of 5 years from the end of the project. The only time when we might have to tell someone about something you or the child have said or done will be if we feel that you or the child are at risk of harm.

Who has reviewed the study?

The University Of Bath has strict rules about what researchers are and are not allowed to do. This is to protect the rights and safety of the people who volunteer to take part in the research. This study has been approved by the University Ethics Committee, and allowed to proceed. This means that they are satisfied that the study will not harm you or the child in any way. Everyone involved with this study has also been checked by The Disclosure and Barring Service (DBS) to make sure that they have no criminal record and are allowed to work with children. The Headteacher of your child's school will be given a copy of the Disclosure and Barring certificate for each practitioner who will be in contact with your child if you decide to take part in the study. You may request to see this certificate from your Headteacher or from myself at any point during the study. If you would like to see the DBS certificate before you decide to take part in the study please contact me by email on melmj@btinternet.com or by telephone on 01488 648741.

What if something goes wrong?

If you have any questions or concerns at all about anything related to the study, please contact me by email on melmj@btinternet.com or by telephone on 01488 648741. You can also contact my supervisors by email, Dr. Knott (f.j.knott@reading.ac.uk) or Dr. Ashwin (c.ashwin@bath.ac.uk). All practitioners involved will have professional indemnity insurance regarding any compensation issues.

How can I find out more about the study.

You are welcome to contact me by telephone or email using the information provided below at any point to ask any questions that you may have about this study.

What do I have to do next?

If you would like to take part in this study, please read through the child information sheet with your child and help him to decide whether or not to take part. If you both decide you want to take part, either return the reply-slip included in this information pack or contact me by email or phone.

Thank you.

Melanie Morgan-Jones

email: melmj@btinternet.com

Phone: 01488 648741

Supervisors:

Dr. Fiona Knott f.j.knott@reading.ac.uk

Dr Chris Ashwin c.ashwin@bath.ac.uk

APPENDIX 10 -

CONSENT FORM

University of Bath, Department of Health

Consent form

Project Title: "Does Fascia Bowen therapy improve neuromuscular function and psychological well-being in males aged 8-11(at primary school) diagnosed with DCD?"

I understand that participation in this study is entirely voluntary and I can withdraw from the study at any time without giving a reason. ☐

I have been given information about the research and what it involves, and I am happy to take part. ☐

I understand that all my personal details will be kept confidential. ☐

I confirm that I have been given the opportunity to ask questions. ☐

______________________________	_________	________________________
Name of Participant/Parent/guardian	Date	Signature
______________________________	_________	________________________
Name of Researcher (Print)	Date	Signature

____
Name of child (Print)

APPENDIX 11 -

MABC-2 – AGE BAND 2 (7-10 YEARS)

Movement Assessment Battery for Children – 2

Test Record Form Age Band 2 (7-10 years)

Name:			Gender: M / F	
Home address:				
School:			Class/year/grade:	
Assessed by:				
Referral source:				
Preferred (writing) hand:		Year	Month	Day

Movement ABC-2
Checklist completed? Y / N

	Year	Month	Day
Date tested			
Date of birth			
Chronological age			

Item Scores and Equivalent Standard Scores

Item code	Name of item	Raw score (best attempt)	Item Standard Score
MD 1*	Placing Pegs preferred hand		
	Placing Pegs non-pref hand		
MD 2	Threading Lace		
MD 3	Drawing Trail 2		
A&C 1	Catching with Two Hands		
A&C 2	Throwing Beanbag onto Mat		
Bal 1*	One-Board Balance best leg		
	One-Board Balance other leg		
Bal 2	Walking Heel-to-Toe Forwards		
Bal 3*	Hopping on Mats best leg		
	Hopping on Mats other leg		
Total Test Score Sum of 8 item **standard** scores:			

*For Placing Pegs, One-Board Balance and Hopping on Mats, look up standard score for each limb, add them and divide by 2. If the

Three Component Scores[†]

Manual Dexterity^ MD 1 + MD 2 + MD 3

Component score	Standard Score	Percentile

Aiming & Catching^ A&C 1 + A&C 2

Component score	Standard Score	Percentile

Balance^ Bal 1 + Bal 2 + Bal 3

Component score	Standard Score	Percentile

^In each case sum the item standard scores.

Total Test Score	Standard Score	Percentile Rank

Manual Dexterity 1: PLACING PEGS

Record: Preferred hand: R / L (should be same as for Drawing Trail); Time taken (secs); F for failure; R for refusal; I if inappropriate (note reasons below)

Preferred hand	
Trial 1	
Trial 2	

Non-preferred hand	
Trial 1	
Trial 2	

Qualitative observations

Posture/body control

- Sitting posture is poor ☐
- Holds head too close to task ☐
- Holds head at an odd angle ☐
- Does not look at board while inserting pegs ☐
- Does not use pincer grip to pick up pegs ☐
- Exaggerates finger movements in releasing pegs ☐
- Does not use the supporting hand to hold board steady ☐
- Does extremely poorly with one hand (asymmetry striking) ☐
- Changes hands or uses both hands during a trial ☐
- Hand movements are jerky ☐
- Moves constantly/fidgets ☐

Adjustment to task requirements

- Misaligns pegs with respect to holes ☐
- Uses excessive force when inserting pegs ☐
- Is exceptionally slow/does not change speed from trial to trial ☐
- Goes too fast for accuracy ☐

Other ____________________

Comments: ____________________

Manual Dexterity 2: THREADING LACE

Record: Time taken (secs); F for failure; R for refusal; I if inappropriate (note reasons below)

No. of seconds	
Trial 1	
Trial 2	

Qualitative observations

Posture/body control

- Sitting posture is poor ☐
- Holds materials too close to face ☐
- Holds head at an odd angle ☐
- Does not look at board while inserting tip of lace ☐
- Does not use pincer grip to hold lace ☐
- Holds lace too far from tip ☐
- Holds lace too near tip ☐
- Finds it difficult to push tip with one hand and pull it through with the other ☐
- Changes threading hands during a trial ☐
- Hand movements are jerky ☐
- Moves constantly/fidgets ☐

Adjustment to task requirements

- Sometimes misses hole with tip of lace ☐
- Gets muddled in the threading sequence ☐
- Is exceptionally slow/does not change speed from trial to trial ☐
- Goes too fast for accuracy ☐

Other ____________________

Manual Dexterity 3: DRAWING TRAIL 2

Note: BIC Atlantis pen to be used

Record: Hand used: R/L/Both; No. of errors; **F** for failure; **R** for refusal; **I** if inappropriate (note reasons below)
Number of errors should be counted after testing using scoring criteria provided in Appendix A of the Manual.

	No. of errors
Trial 1	
Trial 2	

Do not administer a second trial if the child completes the first trial perfectly (i.e. no errors).

Qualitative observations

Posture/body control

- Sitting posture is poor ☐
- Holds head too near paper ☐
- Holds head at an odd angle ☐
- Does not look at trail ☐
- Holds pen with an odd/immature grip ☐
- Holds pen too far from point ☐
- Holds pen too close to point ☐
- Does not hold paper still ☐
- Changes hands during a trial ☐
- Moves constantly/fidgets ☐

Adjustment to task requirements

- Progresses in short jerky movements ☐
- Uses excessive force, presses very hard on paper ☐
- Is exceptionally slow ☐
- Goes too fast for accuracy ☐

Other ______

Comments: ______

Aiming & Catching 1: CATCHING WITH TWO HANDS

Note: With a bounce at 7 and 8; without a bounce at 9 and 10

Record: Number of correctly executed catches; **R** for refusal; **I** if inappropriate (note reasons below)

Practice: ☐☐☐☐☐ 10 Trials: ☐☐☐☐☐☐☐☐☐☐ Total: ______

Qualitative observations

Posture/body control

- Standing posture is poor ☐
- Does not follow trajectory of ball with eyes ☐
- Turns away or closes eyes as ball approaches ☐
- Arms are not raised symmetrically for catching ☐
- Holds hands out flat with fingers stiff as the ball approaches ☐
- Hands and arms held wide apart, fingers extended ☐
- Arms and hands do not 'give' to meet impact of ball ☐
- Fingers close too early or too late ☐
- Movements lack fluency ☐

Adjustment to task requirements

- Does not adjust body position for catching ☐
- Does not adjust position of feet as necessary ☐
- Judges force of throw poorly (too much or too little) ☐
- Does not adjust to height of rebound ☐
- Does not adjust to direction of rebound ☐
- Does not adjust to force of rebound ☐

Other ______

Comments: ______

Aiming & Catching 2: THROWING BEANBAG ONTO MAT

Note: Target is the orange circle, not the whole mat

Record: Hand used: R / L / Both; Number of successful hits; **R** for refusal; **I** if inappropriate (note reasons below)

Practice: ☐☐☐☐☐ 10 Trials: ☐☐☐☐☐☐☐☐☐☐ Total:________

Qualitative observations

Posture/body control

- Balance while throwing is poor ☐
- Does not keep eyes on target ☐
- Does not use a pendular swing of the arm ☐
- Does not follow through with the throwing arm ☐
- Releases beanbag too early or too late ☐
- Changes hands from trial to trial ☐
- Movements lack fluency ☐

Adjustment to task requirements

- Errors are consistently to one side of target (asymmetry striking) ☐
- Control of direction variable ☐
- Judges force of throw poorly (too much or too little) ☐
- Control of force is variable ☐
- **Other** ________________

Comments: ________________

Balance 1: ONE-BOARD BALANCE

Record: Time balanced (secs); **R** for refusal; **I** if inappropriate (note reasons below)

		No. of seconds			No. of seconds
Right Leg	Trial 1		Left Leg	Trial 1	
	Trial 2			Trial 2	

Do not administer a second trial if the child maintains balance for 30 seconds

Qualitative observations

Posture/body control

- Body appears rigid/tense ☐
- Body appears limp/floppy ☐
- Sways wildly to try to maintain balance ☐
- Does not hold head and eyes steady ☐
- Makes no or few compensatory arm movements to help maintain balance ☐
- Exaggerated movements of arms and trunk disrupt balance ☐
- Does extremely poorly on one leg (asymmetry striking) ☐
- **Other** ________________

Comments: ________________

Balance 2: WALKING HEEL-TO-TOE FORWARDS

Record: Number of correct consecutive steps from the beginning of the line; Whether entire line was walked successfully; **R** for refusal; **I** if inappropriate (note reasons below)

	No. of steps	Entire line?
Trial 1		YES / NO
Trial 2		YES / NO

Do not administer a second trial if the child completes 15 steps OR completes the whole line in fewer than 15 correctly executed steps.

Qualitative observations

Posture/body control

- Body appears rigid/tense ☐
- Body appears limp/floppy ☐
- Sways wildly to try to maintain balance ☐
- Does not keep head steady ☐
- Does not compensate with arms to maintain balance ☐
- Exaggerated arm movements disrupt balance ☐
- Is very wobbly when placing feet on line ☐

Adjustment to task requirements

- Goes too fast for accuracy ☐
- Individual movements lack smoothness and fluency ☐
- Sequencing of steps is not smooth/pauses frequently ☐

Other __________

Comments: __________

Balance 3: HOPPING ON MATS

Record: Number of correct consecutive hops (maximum of 5); **R** for refusal; **I** if inappropriate (note reasons below)

		No. of hops			No. of hops
Right Leg	Trial 1		Left Leg	Trial 1	
	Trial 2			Trial 2	

Do not administer a second trial if the child completes 5 perfect hops on the first trial

Qualitative observations

Posture/body control

- Body appears rigid/tense ☐
- Body appears limp/floppy ☐
- Non-supporting leg held up in front of body ☐
- Hops with stiff legs/on flat feet ☐
- Lacks springiness/no push-off from feet ☐
- Arm movements are exaggerated ☐
- Arms swing out of phase with legs ☐
- Does not use arms to assist hop ☐
- Stumbles on landing ☐
- Does extremely poorly with one leg (asymmetry striking) ☐

Adjustments to task requirements

- Goes too fast for accuracy ☐
- Does not combine upward and forward movements effectively ☐
- Uses too much effort ☐
- Movements are jerky ☐

Other __________

NON-MOTOR FACTORS THAT MIGHT AFFECT MOVEMENT

Complete the sections below by noting any features of the child's behaviour during testing that you suspect might have affected his or her motor performance. Headings (with examples) are given as guidelines only. Although negative aspects are given more emphasis, remember to note positive aspects of the child's behaviour.

	Yes	No
1. **Disorganised** (e.g. scattered clothes slows up dressing after PE; puts on shoes before socks).		
2. **Hesitant/forgetful** (e.g. slow to start complex actions; forgets what to do in the middle of an action sequence).		
3. **Passive** (e.g. hard to interest; requires much encouragement to participate).		
4. **Timid** (e.g. fearful of activities such as jumping/climbing; constantly asks for assistance).		
5. **Anxious** (e.g. trembles; becomes flustered in a stressful situation).		
6. **Impulsive** (e.g. starts before instructions are complete; impatient of detail).		
7. **Distractible** (e.g. looks around; responds to irrelevant noises).		
8. **Overactive** (e.g. squirms and fidgets; moves constantly when listening to instructions, fiddles with clothes).		
9. **Overestimates own ability** (e.g. tries to make tasks more difficult; tries to do things too fast).		
10. **Underestimates own ability** (e.g. complains of task difficulty; anticipates failure before starting).		
11. **Lacks persistence** (e.g. gives up quickly; is easily frustrated).		
12. **Upset by failure** (e.g. looks tearful; refuses to try task again).		
13. **Unable to get pleasure from success** (e.g. fails to respond to praise).		
Other (please specify).		
Overall, do you think these problems prevent the child from demonstrating his or her true movement capability (please circle)	not at all a little a great deal	

PHYSICAL FACTORS THAT MIGHT AFFECT MOVEMENT

Anatomical/postural defect: YES / NO Specify, if possible	
Vision defect: YES / NO	**Hearing defect:** YES / NO
Judgement of weight: average / overweight / underweight	
Judgement of height: average / tall / short	
Other	

SUMMARY OF QUALITATIVE OBSERVATIONS

MANUAL DEXTERITY (Body control/posture; functioning of limbs; spatial accuracy, control of force/effort, timing of actions; other observations including response to feedback during *informal* testing)

AIMING & CATCHING (Body control/posture; functioning of limbs; spatial accuracy, control of force/effort, timing of actions; other observations including response to feedback during *informal* testing)

STATIC AND DYNAMIC BALANCE (Body control/posture; functioning of limbs; spatial accuracy, control of force/effort, timing of actions; other observations including response to feedback during *informal* testing)

ASSESSMENT SUMMARY AND INTERVENTION PLAN

Name:		Gender: M / F
Home address:		
School:	Class/Year/Grade:	Referral Source:
Movement Coach:	Date of meeting:	

A. Movement Competence

1. Results on standardised tests (enter total scores and mark percentiles)

Movement ABC-2 Test	Total Test Score				
Movement ABC-2 Checklist	Total Motor Score				

2. Profile of competence on Test and Checklist

Movement ABC-2 Test	Manual Dexterity				
	Aiming & Catching				
	Balance				
Movement ABC-2 Checklist	Section A Score		Comment		
	Section B Score				

3. Summary of motor observations common to Test and Checklist (use qualitative data from Test, along with individual item data from Checklist)

4. Other test data (summarise and describe outcome)

5. Child interview (summarise and list three main movement concerns)

6. Parent interview (summarise and list three main movement concerns)

7. School concerns in relation to movement

B. Non-motor factors that might affect the child's ability to perform/learn movement skills

The Movement ABC-2 Test and Checklist provide information on factors that might affect the child's ability to learn or perform movement skills. Examine the appropriate sections in the Test and Checklist, combine with any other data available, and summarise these here.

C. Overall profile of child's strengths and weaknesses

For some children the results of formal assessments of various kinds will be available. For others, school reports and interviews will provide enough information. Describe here any information you consider relevant to planning a movement programme for the child.

D. Environmental context

Varying amounts of support will be available for the child. Summarise here the potential – give names and degree of commitment where possible and specify the contribution to be made.

At home:

At school:

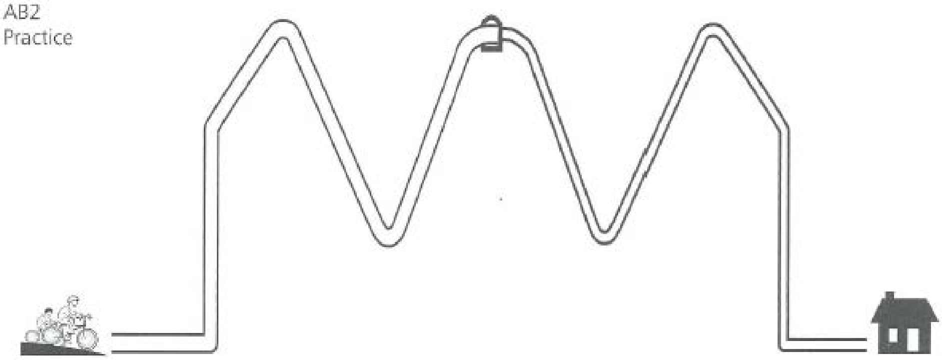
From the health services:

In the community:

E. Objectives and main priorities

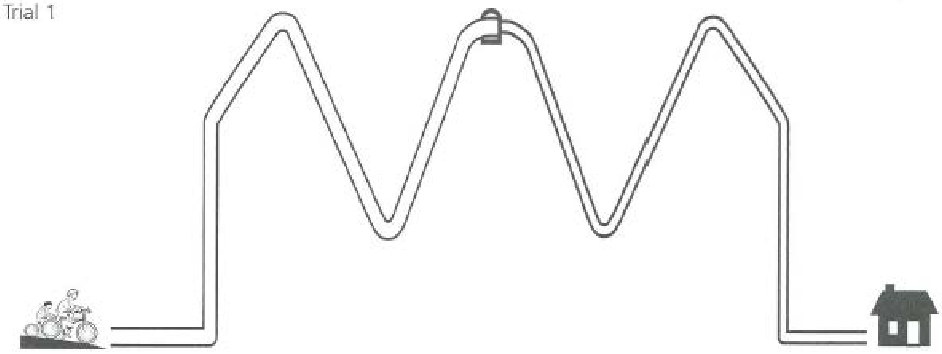
Summarise here the agreed short-term movement objectives for the child (and non-motor if any). Specify the target time for achievement and date of first review. On a separate sheet(s) outline in more detail how and where each target skill will be taught, and sketch the longer-term objectives.

AB2
Practice



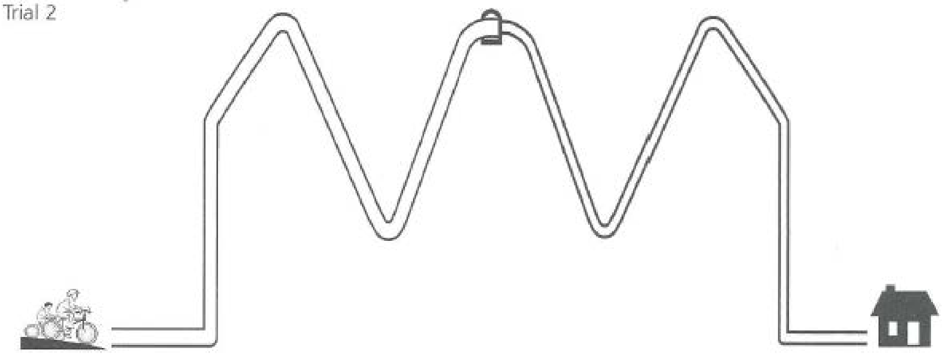
Name ______________________________

Trial 1



Name ______________________________

Trial 2



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APPENDIX 12 -

MABC-2 – AGE BAND 3 (11-16 YEARS)

Movement Assessment Battery for Children – 2

Test Record Form Age Band 3 (11-16 years)

Name: Gender: M / F

Home address:

School: Class/year/grade:

Assessed by:

Referral source:

Preferred (writing) hand:

	Year	Month	Day
Date tested			
Date of birth			
Chronological age			

Movement ABC-2
Checklist completed? Y / N

Item Scores and Equivalent Standard Scores

Item code	Name of item	Raw score (best attempt)	Item Standard Score
MD 1*	Turning Pegs preferred hand		
	Turning Pegs non-pref hand		
MD 2	Triangle with Nuts and Bolts		
MD 3	Drawing Trail 3		
A&C 1*	Catching with one Hand – best hand		
	Catching with one Hand – other hand		
A&C 2	Throwing at Wall Target		
Bal 1	Two-Board Balance		
Bal 2	Walking Toe-to-Heel Backwards		
Bal 3*	Zig-Zag Hopping best Leg		
	Zig-Zag Hopping other Leg		
Total Test Score Sum of 8 item **standard** scores:			

*For Turning Pegs, Catching with One Hand and Zig Zag Hopping, look up standard score for each limb, add these and divide by 2. If the result is above 10, round up; if below 10, round down.

Three Component Scores^

Manual Dexterity^ MD 1 + MD 2 + MD 3		
Component score	Standard Score	Percentile

Aiming & Catching^ A&C 1 + A&C 2		
Component score	Standard Score	Percentile

Balance^ Bal 1 + Bal 2 + Bal 3		
Component score	Standard Score	Percentile

^In each case sum the item standard scores.

Total Test Score	Standard Score	Percentile Rank

Manual Dexterity 1: TURNING PEGS

Record: Preferred hand: R / L (should be same as for Drawing Trail); Time taken (secs); **F** for failure; **R** for refusal; **I** if inappropriate (note reasons below)

Preferred hand	
Trial 1	
Trial 2	

Non-preferred hand	
Trial 1	
Trial 2	

Qualitative observations

Posture/body control

- Sitting posture is poor ☐
- Holds head too close to task ☐
- Holds head at an odd angle ☐
- Does not look while manipulating pegs ☐
- Does not use pincer grip to pick up pegs ☐
- Exaggerates finger movements in releasing pegs ☐
- Does not use the supporting hand to hold board steady ☐
- Does extremely poorly with one hand (asymmetry striking) ☐
- Changes hands or uses both hands during a trial ☐
- Hand movements are jerky ☐
- Moves constantly/fidgets ☐

Adjustment to task requirements

- Misaligns pegs with respect to holes ☐
- Uses excessive force when inserting pegs ☐
- Is exceptionally slow/does not change speed from trial to trial ☐
- Goes too fast for accuracy ☐

Other ____________________

Comments: ____________________

Manual Dexterity 2: TRIANGLE WITH NUTS AND BOLTS

Record: Time taken (secs); **F** for failure; **R** for refusal; **I** if inappropriate (note reasons below)

No. of seconds	
Trial 1	
Trial 2	

Qualitative observations

Posture/body control

- Sitting posture is poor ☐
- Holds materials too close to face ☐
- Holds head at an odd angle ☐
- Does not look at hole while inserting bolt ☐
- Does not use pincer grip to hold nuts and bolts ☐
- Finds it difficult to hold bolt with one hand and screw nut on with the other ☐
- Changes hands during a trial ☐
- Hand movements are jerky ☐
- Moves constantly/fidgets ☐

Adjustment to task requirements

- Sometimes misses hole with tip of bolt ☐
- Gets muddled in the construction sequence ☐
- Is exceptionally slow/does not change speed from trial to trial ☐
- Goes too fast for accuracy ☐

Other ____________________

Comments: ____________________

Manual Dexterity 3: DRAWING TRAIL 3

Note: Bic Atlantis pen to be used

Record: Hand used: R/L/Both; No. of errors; F for failure; R for refusal; I if inappropriate (note reasons below)
Number of errors should be counted after testing using scoring criteria provided in Appendix A of the Manual.

	No. of errors
Trial 1	
Trial 2	

Do not administer a second trial if the child completes the first trial perfectly (i.e. no errors).

Qualitative observations

Posture/body control

- Sitting posture is poor ☐
- Holds head too near paper ☐
- Holds head at an odd angle ☐
- Does not look at trail ☐
- Holds pen with an odd/immature grip ☐
- Holds pen too far from point ☐
- Holds pen too close to point ☐
- Does not hold paper still ☐
- Changes hands during a trial ☐
- Moves constantly/fidgets ☐

Adjustment to task requirements

- Progresses in short jerky movements ☐
- Uses excessive force, presses very hard on paper ☐
- Is exceptionally slow ☐
- Goes too fast for accuracy ☐

Other ______

Comments: ______

Aiming & Catching 1: CATCHING WITH ONE HAND

Record: Number of correctly executed catches; R for refusal; I if inappropriate (note reasons below)

Right Hand Practice: ☐☐☐☐☐ 10 Trials: ☐☐☐☐☐☐☐☐☐☐ Total: ______

Left Hand Practice: ☐☐☐☐☐ 10 Trials: ☐☐☐☐☐☐☐☐☐☐ Total: ______

Qualitative observations

Posture/body control

- Standing posture is poor ☐
- Does not follow trajectory of ball with eyes ☐
- Turns away or closes eyes as ball approaches ☐
- Holds hand out flat with fingers stiff as the ball rebounds ☐
- Hands and arms held wide apart, fingers extended ☐
- Arm and hand do not 'give' to meet impact of ball ☐
- Fingers close too early or too late ☐
- Does extremely poorly with one hand (asymmetry striking) ☐
- Movements lack fluency ☐

Adjustment to task requirements

- Does not adjust body position for catching ☐
- Does not adjust position of feet as necessary ☐
- Judges force of throw poorly (too much or too little) ☐
- Does not adjust to height of rebound ☐
- Does not adjust to direction of rebound ☐
- Does not adjust to force of rebound ☐

Other ______

Comments:

Aiming & Catching 2: THROWING AT WALL TARGET

Record: Hand used: R / L / Both; Number of successful hits; **R** for refusal; **I** if inappropriate (note reasons below)

Practice: ☐☐☐☐☐ 10 Trials: ☐☐☐☐☐☐☐☐☐☐ Total:________

Qualitative observations

Posture/body control

- Balance while throwing is poor ☐
- Does not keep eyes on target ☐
- Does not follow through with the throwing arm ☐
- Releases ball too early or too late ☐
- Changes hands from trial to trial ☐
- Movements lack fluency ☐

Adjustment to task requirements

- Errors are consistently to one side of the target (asymmetry striking) ☐
- Control of direction is variable ☐
- Judges force of throw poorly (too much or too little) ☐
- Control of force is variable ☐
- **Other** ________

Comments: ________

Balance 1: TWO-BOARD BALANCE

Record: Time balanced (secs); **R** for refusal; **I** if inappropriate (note reasons below)

	No. of seconds
Trial 1	
Trial 2	

Do not administer a second trial if the child maintains balance for 30 seconds

Qualitative observations

Posture/body control

- Body appears rigid/tense ☐
- Body appears limp/floppy ☐
- Sways wildly to try to maintain balance ☐
- Does not hold head and eyes steady ☐
- Makes no or few compensatory arm movements to help maintain balance ☐
- Exaggerated movements of arms and trunk disrupt balance ☐
- Cannot hold feet in a straight line ☐
- **Other** ________

Comments: ________

Balance 2: WALKING TOE-TO-HEEL BACKWARDS

Record: Number of correct consecutive steps from the beginning of the line; Whether entire line was walked successfully; **R** for refusal; **I** if inappropriate (note reasons below)

	No. of steps	Entire line?
Trial 1		YES / NO
Trial 2		YES / NO

Do not administer a second trial if the child completes 15 steps OR completes the whole line in fewer than 15 correctly executed steps

Qualitative observations

Posture/body control

- Body appears rigid/tense ☐
- Body appears limp/floppy ☐
- Sways wildly to try to maintain balance ☐
- Does not look behind to check position on track ☐
- Does not compensate with arms to maintain balance ☐
- Exaggerated arm movements disrupt balance ☐
- Is very wobbly when placing feet on line ☐

Adjustments to task requirements

- Goes too fast for accuracy ☐
- Individual movements lack smoothness and fluency ☐
- Sequencing of steps is not smooth/pauses frequently ☐
- **Other** ___________

Comments: ___________

Balance 3: ZIG-ZAG HOPPING

Record: Number of correct consecutive hops (maximum of 5); **R** for refusal; **I** if inappropriate (note reasons below)

		No. of hops			No. of hops
Right Leg	Trial 1		Left Leg	Trial 1	
	Trial 2			Trial 2	

Do not administer a second trial if the child completes 5 perfect hops on the first trial

Qualitative observations

Posture/body control

- Body appears rigid/tense ☐
- Body appears limp/floppy ☐
- Non-supporting leg held up in front of body ☐
- Hops with stiff legs/on flat feet ☐
- Lacks springiness/no push-off from feet ☐
- Arm movements are exaggerated ☐
- Does not use arms to assist hop ☐
- Stumbles on landing ☐
- Does extremely poorly with one leg (asymmetry striking) ☐

Adjustments to task requirements

- Goes too fast for accuracy ☐
- Does not combine upward and forward movements effectively ☐
- Uses too much effort ☐
- Movements are jerky ☐
- **Other** ___________

NON-MOTOR FACTORS THAT MIGHT AFFECT MOVEMENT

Complete the sections below by noting any features of the child's behaviour during testing that you suspect might have affected his or her motor performance. Headings (with examples) are given as guidelines only. Although negative aspects are given more emphasis, remember to note positive aspects of the child's behaviour.

	Yes	No
1. **Disorganised** (e.g. scattered clothes slows up dressing after PE; puts on shoes before socks).		
2. **Hesitant/forgetful** (e.g. slow to start complex actions; forgets what to do in the middle of an action sequence).		
3. **Passive** (e.g. hard to interest; requires much encouragement to participate).		
4. **Timid** (e.g. fearful of activities such as jumping/climbing; constantly asks for assistance).		
5. **Anxious** (e.g. trembles; becomes flustered in a stressful situation).		
6. **Impulsive** (e.g. starts before instructions are complete; impatient of detail).		
7. **Distractible** (e.g. looks around; responds to irrelevant noises).		
8. **Overactive** (e.g. squirms and fidgets; moves constantly when listening to instructions, fiddles with clothes).		
9. **Overestimates own ability** (e.g. tries to make tasks more difficult; tries to do things too fast).		
10. **Underestimates own ability** (e.g. complains of task difficulty; anticipates failure before starting).		
11. **Lacks persistence** (e.g. gives up quickly; is easily frustrated).		
12. **Upset by failure** (e.g. looks tearful; refuses to try task again).		
13. **Unable to get pleasure from success** (e.g. fails to respond to praise).		
Other (please specify).		
Overall, do you think these problems prevent the child from demonstrating his or her true movement capability (please circle)	not at all a little a great deal	

PHYSICAL FACTORS THAT MIGHT AFFECT MOVEMENT

Anatomical/postural defect: YES / NO Specify, if possible	
Vision defect: YES / NO	**Hearing defect:** YES / NO
Judgement of weight: average / overweight / underweight	
Judgement of height: average / tall / short	
Other	

SUMMARY OF QUALITATIVE OBSERVATIONS

MANUAL DEXTERITY (Body control/posture; functioning of limbs; spatial accuracy, control of force/effort, timing of actions; other observations including response to feedback during *informal* testing)

AIMING & CATCHING (Body control/posture; functioning of limbs; spatial accuracy, control of force/effort, timing of actions; other observations including response to feedback during *informal* testing)

STATIC AND DYNAMIC BALANCE (Body control/posture; functioning of limbs; spatial accuracy, control of force/effort, timing of actions; other observations including response to feedback during *informal* testing)

ASSESSMENT SUMMARY AND INTERVENTION PLAN

Name:		Gender: M / F
Home address:		
School:	Class/Year/Grade:	Referral Source:
Movement Coach:	Date of meeting:	

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Movement ABC-2 Checklist	Total Motor Score				

2. Profile of competence on Test and Checklist

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	Aiming & Catching				
	Balance				

Movement ABC-2 Checklist	Section A Score		Comment
	Section B Score		

3. Summary of motor observations common to Test and Checklist (use qualitative data from Test, along with individual item data from Checklist)

4. Other test data (summarise and describe outcome)

5. Child interview (summarise and list three main movement concerns)

6. Parent interview (summarise and list three main movement concerns)

7. School concerns in relation to movement

B. Non-motor factors that might affect the child's ability to perform/learn movement skills

The Movement ABC-2 Test and Checklist provide information on factors that might affect the child's ability to learn or perform movement skills. Examine the appropriate sections in the Test and Checklist, combine with any other data available, and summarise these here.

C. Overall profile of child's strengths and weaknesses

For some children the results of formal assessments of various kinds will be available. For others, school reports and interviews will provide enough information. Describe here any information you consider relevant to planning a movement programme for the child.

D. Environmental context

Varying amounts of support will be available for the child. Summarise here the potential – give names and degree of commitment where possible and specify the contribution to be made.

At home:

At school:

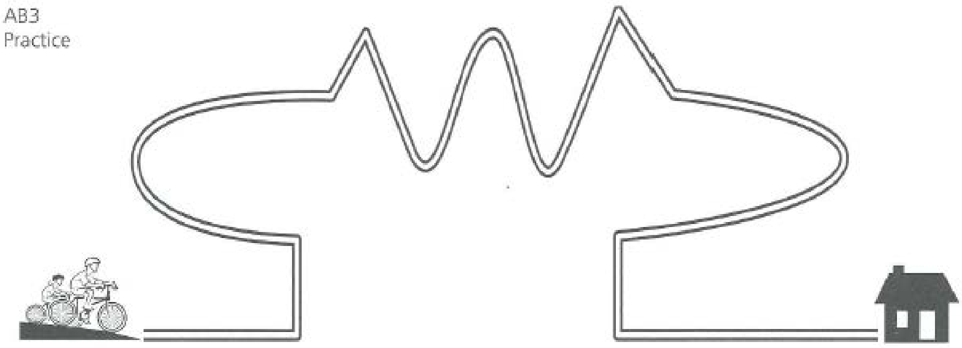
From the health services:

In the community:

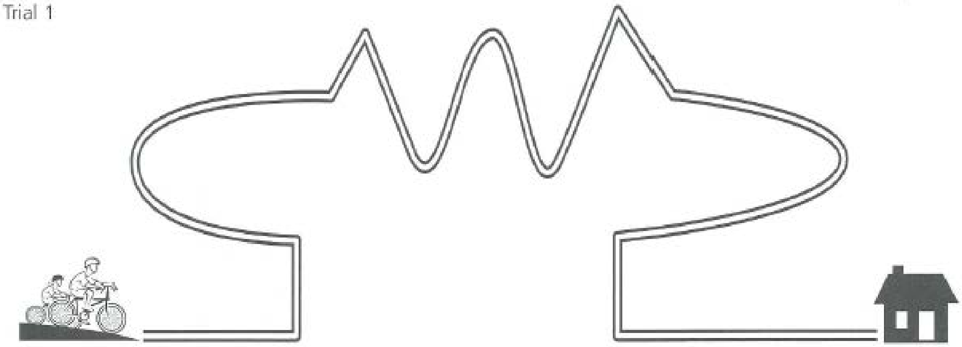
E. Objectives and main priorities

Summarise here the agreed short-term movement objectives for the child (and non-motor if any). Specify the target time for achievement and date of first review. On a separate sheet(s) outline in more detail how and where each target skill will be taught, and sketch the longer-term objectives.

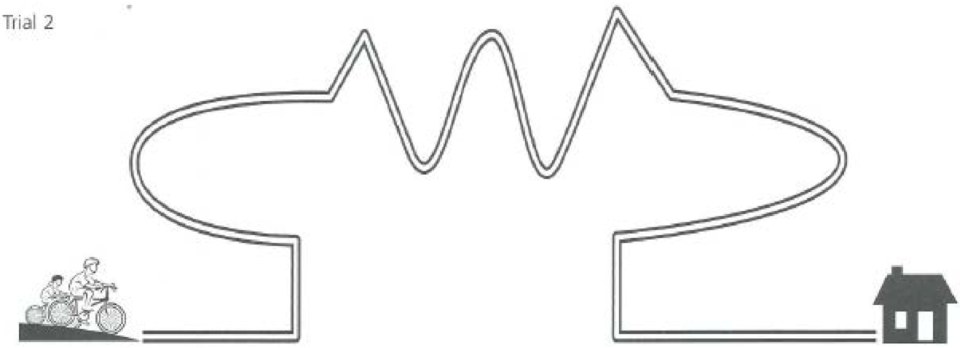
AB3
Practice



Trial 1



Trial 2



APPENDIX 13 -

SELF PERCEPTION PROFILE FOR CHILDREN

What I Am Like

Name________________________Age_____Birthday _______________ ☐ Boy ☐ Girl

Month Day (check one)

	Really True for me	Sort of True for me				Sort of True for me	Really True for me
			Sample Sentence				
a.	☐	☐	Some kids would rather play outdoors in their spare time	**BUT**	Other kids would rather watch T.V.	☐	☐
1.	☐	☐	Some kids feel that they are very good at their school work	**BUT**	Other kids worry about whether they can do the school work assigned to them	☐	☐
2.	☐	☐	Some kids find it hard to make friends	**BUT**	Other kids find it pretty easy to make friends	☐	☐
3.	☐	☐	Some kids do very well at all kinds of sports	**BUT**	Other kids don't feel that they are very good when it comes to sports	☐	☐
4.	☐	☐	Some kids are happy with the way they look	**BUT**	Other kids are *not* happy with the way they look	☐	☐
5.	☐	☐	Some kids often do not like the way they behave	**BUT**	Other kids usually like the way they behave	☐	☐
6.	☐	☐	Some kids are often unhappy with themselves	**BUT**	Other kids are pretty pleased with themselves	☐	☐
7.	☐	☐	Some kids feel like they are just as smart as other kids their age	**BUT**	Other kids aren't so sure and wonder if they are as smart	☐	☐
8.	☐	☐	Some kids know how to make classmates like them	**BUT**	Other kids don't know how to make classmates like them	☐	☐
9.	☐	☐	Some kids wish they could be a lot better at sports	**BUT**	Other kids feel they are good enough at sports	☐	☐
10.	☐	☐	Some kids are happy with their height and weight	**BUT**	Other kids wish their height or weight were different	☐	☐
11.	☐	☐	Some kids usually do the right thing	**BUT**	Other kids often don't do the right thing	☐	☐

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	Really True for me	Sort of True for me				Sort of True for me	Really True for me
12.	☐	☐	Some kids don't like the way they are leading their life	BUT	Other kids *do* like the way they are leading their life	☐	☐
13.	☐	☐	Some kids are pretty slow in finishing their school work	BUT	Other kids can do their school work quickly	☐	☐
14.	☐	☐	Some kids don't have the social skills to make friends	BUT	Other kids do have the social skills to make friends	☐	☐
15.	☐	☐	Some kids think they could do well at just about any new sports activity they haven't tried before	BUT	Other kids are afraid they might not do well at sports they haven't ever tried	☐	☐
16.	☐	☐	Some kids wish their body was different	BUT	Other kids like their body the way it is	☐	☐
17.	☐	☐	Some kids usually act the way they know they are supposed to	BUT	Other kids often don't act the way they are supposed to	☐	☐
18.	☐	☐	Some kids are happy with themselves as a person	BUT	Other kids are often not happy with themselves	☐	☐
19.	☐	☐	Some kids often forget what they learn	BUT	Other kids can remember things easily	☐	☐
20.	☐	☐	Some kids understand how to get peers to accept them	BUT	Other kids don't understand how to get peers to accept them	☐	☐
21.	☐	☐	Some kids feel that they are better than others their age at sports	BUT	Other kids don't feel they can play as well	☐	☐
22.	☐	☐	Some kids wish their physical appearance (how they look) was different	BUT	Other kids like their physical appearance the way it is	☐	☐
23.	☐	☐	Some kids usually get in trouble because of things they do	BUT	Other kids usually don't do things that get them in trouble	☐	☐
24.	☐	☐	Some kids like the kind of person they are	BUT	Other kids often wish they were someone else	☐	☐

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	Really True for me	Sort of True for me				Sort of True for me	Really True for me
25.	☐	☐	Some kids do very well at their classwork	**BUT**	Other kids don't do very well at their classwork	☐	☐
26.	☐	☐	Some kids wish they knew how to make more friends	**BUT**	Other kids know how to make as many friends as they want	☐	☐
27.	☐	☐	In games and sports some kids usually watch instead of play	**BUT**	Other kids usually play rather than just watch	☐	☐
28.	☐	☐	Some kids wish something about their face or hair looked different	**BUT**	Other kids like their face and hair the way they are	☐	☐
29.	☐	☐	Some kids do things they know they shouldn't do	**BUT**	Other kids hardly ever do things they know they shouldn't do	☐	☐
30.	☐	☐	Some kids are very happy being the way they are	**BUT**	Other kids wish they were different	☐	☐
31.	☐	☐	Some kids have trouble figuring out the answers in school	**BUT**	Other kids almost always can figure out the answers	☐	☐
32.	☐	☐	Some kids know how to become popular	**BUT**	Other kids do not know how to become popular	☐	☐
33.	☐	☐	Some kids don't do well at new outdoor games	**BUT**	Other kids are good at new games right away	☐	☐
34.	☐	☐	Some kids think that they are good looking	**BUT**	Other kids think that they are not very good looking	☐	☐
35.	☐	☐	Some kids behave themselves very well	**BUT**	Other kids often find it hard to behave themselves	☐	☐
36.	☐	☐	Some kids are not very happy with the way they do a lot of things	**BUT**	Other kids think the way they do things is fine	☐	☐

APPENDIX 14 -

SOCIAL SKILLS QUESTIONNAIRE (PUPILS)

SOCIAL SKILLS QUESTIONNAIRE (PUPILS)

YOUR DATE OF BIRTH: GRADE: SCHOOL:
DATE: AGE: SEX:

Please put a circle around the rating which best describes you over the past 4 weeks. Please answer all questions.

1. I listen to other people's point of view during arguments	not true	sometimes true	mostly true
2. I make requests from my parents in a polite way	not true	sometimes true	mostly true
3. I control my temper when I lose in a game or competition	not true	sometimes true	mostly true
4. I control my temper if other kids tease me or say unkind things	not true	sometimes true	mostly true
5. I ask other kids in a nice way if I want to join in their activities	not true	sometimes true	mostly true
6. I show other people if I feel affectionate or good towards them	not true	sometimes true	mostly true
7. I do kind things for other people without having to be asked	not true	sometimes true	mostly true
8. I say nice things to others when they deserve it	not true	sometimes true	mostly true
9. I control my temper when I am told off or criticized by parents	not true	sometimes true	mostly true
10. I ask permission before I borrow or use other people's things	not true	sometimes true	mostly true
11. I share things with other kids	not true	sometimes true	mostly true
12. I control my temper during disagreements with other kids	not true	sometimes true	mostly true
13. I ask other kids if I can join in their activities	not true	sometimes true	mostly true
14. The expression on my face is usually right (not always angry or grinning)	not true	sometimes true	mostly true
15. I say I am sorry when I do something wrong	not true	sometimes true	mostly true
16. I join in family activities	not true	sometimes true	mostly true
17. I invite other kids to join in my games or activities	not true	sometimes true	mostly true
18. I tell a parent or teacher if I have a problem or need help	not true	sometimes true	mostly true
19. I show that I am worried or that I care if someone is hurt or upset	not true	sometimes true	mostly true
20. I follow the rules in games or sports	not true	sometimes true	mostly true
21. I take part in games and activities with other kids	not true	sometimes true	mostly true
22. I have conversations with adults	not true	sometimes true	mostly true
23. I look people in the eye when we are talking	not true	sometimes true	mostly true
24. My voice usually sounds friendly (not aggressive or unusual)	not true	sometimes true	mostly true
25. I control my temper when I do not get my own way with my parents or teachers	not true	sometimes true	mostly true
26. I laugh or smile when I am happy or hear funny things	not true	sometimes true	mostly true
27. I have conversations with other kids	not true	sometimes true	mostly true
28. I show other people that I am listening when we are talking	not true	sometimes true	mostly true
29. I can show people when I am angry without losing my temper	not true	sometimes true	mostly true
30. I stand up for myself if other kids behave badly towards me without losing my temper	not true	sometimes true	mostly true

APPENDIX 15 -

SCHOLASTIC FUNCTION

Please consider the behaviour and function of the child within the last two weeks during lesson times.

Child's name: ______________________ Class: ____________________________

School : ______________________ Date completed: ____________________

Name of Person completing the form: ____

Key

1	2	3	4	5
Very Poor	Poor	Barely acceptable	Good	Very Good

Please tick the appropriate box using a black biro/ink pen

Attention - How well have they focused in lessons within the last two weeks?

1	2	3	4	5

Concentration span- How long have they concentrated during the lessons in the last two weeks?

1	2	3	4	5

Work completion rate- How quickly have they been completing their work in the last two weeks?

1	2	3	4	5

Handwriting quality- How is their writing quality in the last two weeks.

1	2	3	4	5

APPENDIX 16 -
SOCIAL SKILLS QUESTIONNAIRE
(TEACHERS)

SOCIAL SKILLS QUESTIONNAIRE (TEACHERS).

DATE: PUPIL'S NAME: PUPIL'S SEX:
GRADE: SCHOOL: PUPIL'S AGE:

TEACHER'S NAME OR INITIAL:

Please put a circle around the rating which best describes this pupil over the past 4weeks. Please circle the **0 if the item is not true**. Circle the number **1 if the item is sometimes true**. If the item is **mostly true, then circle the number 2**. Please answer all items.

0=not true, 1=sometimes true, 2= mostly true

1. Listens to other people's points of view during arguments	0	1	2
2. Makes requests from teachers in a polite way	0	1	2
3. Controls his/her temper when he/she loses in a game or competition	0	1	2
4. Reacts appropriately if peers tease him/her or say unkind things	0	1	2
5. Asks to join in activities with peers in an appropriate manner	0	1	2
6. Expresses affection or positive feelings to others	0	1	2
7. Does kind things for others voluntarily	0	1	2
8. Gives compliments or says nice things to others when appropriate	0	1	2
9. Controls his/her temper when told off or criticized by teachers	0	1	2
10. Asks permission before borrowing or using other people's things	0	1	2
11. Shares things with peers	0	1	2
12. Controls his/her temper during disagreements with peers	0	1	2
13. Asks peers if he/she may join in their activities	0	1	2
14. Has an appropriate facial expression (eg. not excessive grinning or aggressive)	0	1	2
15. Apologizes when he/she does something wrong	0	1	2
16. Spends free time in the company of peers	0	1	2
17. Invites others to join in games or activities	0	1	2
18. Tells a teacher if he/she has a problem or needs help	0	1	2
19. Expresses sympathy or concern to others who are hurt or upset	0	1	2
20. Follows the rules in games or sports activities	0	1	2
21. Takes part in games and activities with peers	0	1	2
22. Takes part in conversations with adults	0	1	2
23. Makes eye contact appropriately with others during conversations	0	1	2
24. His/her tone of voice is appropriate (eg. not aggressive or unusual)	0	1	2
25. Controls his/her temper when he/she does not get his/her own way with teachers	0	1	2
26. Laughs or smiles when appropriate	0	1	2
27. Takes part in conversations with peers	0	1	2
28. Shows that he/she is listening to others during conversations	0	1	2
29. Can express his/her feelings of anger but without losing his/her temper	0	1	2
30. Stands up for him/herself appropriately if peers act unreasonably	0	1	2

APPENDIX 17 -

STRENGTHS AND DIFFICULTIES QUESTIONNAIRE

UNIVERSITY OF BATH

Strengths and Difficulties Questionnaire

For each item, please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not absolutely certain or the item seems daft! Please give your answers on the basis of the child's behaviour over the last six months or this school year.

Child's Name .... Male/Female

Date of Birth..

	Not True	Somewhat True	Certainly True
Considerate of other people's feelings	☐	☐	☐
Restless, overactive, cannot stay still for long	☐	☐	☐
Often complains of headaches, stomach-aches or sickness	☐	☐	☐
Shares readily with other children (treats, toys, pencils etc.)	☐	☐	☐
Often has temper tantrums or hot tempers	☐	☐	☐
Rather solitary, tends to play alone	☐	☐	☐
Generally obedient, usually does what adults request	☐	☐	☐
Many worries, often seems worried	☐	☐	☐
Helpful if someone is hurt, upset or feeling ill	☐	☐	☐
Constantly fidgeting or squirming	☐	☐	☐
Has at least one good friend	☐	☐	☐
Often fights with other children or bullies them	☐	☐	☐
Often unhappy, down-hearted or tearful	☐	☐	☐
Generally liked by other children	☐	☐	☐
Easily distracted, concentration wanders	☐	☐	☐
Nervous or clingy in new situations, easily loses confidence	☐	☐	☐
Kind to younger children	☐	☐	☐
Often lies or cheats	☐	☐	☐
Picked on or bullied by other children	☐	☐	☐
Often volunteers to help others (parents, teachers, other children)	☐	☐	☐
Thinks things out before acting	☐	☐	☐
Steals from home, school or elsewhere	☐	☐	☐
Gets on better with adults than with other children	☐	☐	☐
Many fears, easily scared	☐	☐	☐
Sees tasks through to the end, good attention span	☐	☐	☐

Signature .... Date ....

Parent/Teacher/Other (please specify:)

Thank you very much for your help

APPENDIX 18 -

COORDINATION QUESTIONNAIRE DCD-Q

COORDINATION QUESTIONNAIRE (REVISED 2007)

	Year	Mon	Day
Today's Date:			
Child's Birth:			
Child's Age:			

Name of Child: ______________________

Person completing Questionnaire: ______________________

Relationship to child: ______________________

Most of the motor skills that this questionnaire asks about are things that your child does with his or her hands, or when moving.
A child's coordination may improve each year as they grow and develop. For this reason, it will be easier for you to answer the questions if you think about other children that you know who *are the same age as your child*.
Please compare the degree of coordination your child has with other children of the same age when answering the questions.
Circle the one number that best describes your child. If you change your answer and want to circle another number, please circle the correct response twice.
If you are unclear about the meaning of a question, or about how you would answer a question to best describe your child, please call______________________ at ________________ for assistance.

Not at all like your child 1	A bit like your child 2	Moderately like your child 3	Quite a bit like your child 4	Extremely like your child 5

1. Your child *throws a ball* in a controlled and accurate fashion.

   1 2 3 4 5

2. Your child *catches* a small *ball* (e.g., tennis ball size) thrown from a distance of 6 to 8 feet (1.8 to 2.4 meters).

   1 2 3 4 5

3. Your child *hits* an approaching *ball* or *birdie* with a bat or racquet accurately.

   1 2 3 4 5

4. Your child *jumps* easily *over* obstacles found in garden or play environment.

   1 2 3 4 5

5. Your child *runs* as fast and in a *similar* way to other children of the same gender and age.

   1 2 3 4 5

6. If your child has a *plan* to do a motor *activity*, he/she can organize his/her body to follow the plan and effectively complete the task (e.g., building a cardboard or cushion "fort," moving on playground equipment, building a house or a structure with blocks, or using craft materials).

   1 2 3 4 5 **(OVER)**

	Not at all like your child 1	A bit like your child 2	Moderately like your child 3	Quite a bit like your child 4	Extremely like your child 5

7. Your child's printing or *writing* or drawing in class is *fast* enough to keep up with the rest of the children in the class.

	1	2	3	4	5

8. Your child's printing or *writing* letters, numbers and words is *legible*, precise and accurate or, if your child is not yet printing, he or she *colors and draws* in a coordinated way and makes pictures that you can recognize.

	1	2	3	4	5

9. Your child uses appropriate *effort* or tension when printing or writing or drawing (no excessive *pressure* or tightness of grasp on the pencil, writing is not too heavy or dark, or too light).

	1	2	3	4	5

10. Your child *cuts* out pictures and *shapes* accurately and easily.

	1	2	3	4	5

11. Your child is interested in and *likes* participating in *sports or active* games requiring good motor skills.

	1	2	3	4	5

12. Your child learns *new motor tasks* (e.g., swimming, rollerblading) easily and does not require more practice or time than other children to achieve the same level of skill.

	1	2	3	4	5

13. Your child is *quick and competent* in tidying up, putting on shoes, tying shoes, dressing, etc.

	1	2	3	4	5

14. Your child would *never* be described as a *"bull in a china shop"* (that is, appears so clumsy that he or she might break fragile things in a small room).

	1	2	3	4	5

15. Your child does *not fatigue easily* or appear to slouch and "fall out" of the chair if required to sit for long periods.

	1	2	3	4	5

Thank you.

COORDINATION QUESTIONNAIRE (DCDQ'07): SCORE SHEET

Name: ______________________ **Date:** ______________

Birth Date: ______________________ **Age:** ______________

	Control During Movement	Fine Motor/ Handwriting	General Coordination
1. Throws ball			
2. Catches ball			
3. Hits ball/birdie			
4. Jumps over			
5. Runs			
6. Plans activity			
7. Writing fast			
8. Writing legibly			
9. Effort and pressure			
10. Cuts			
11. Likes sports			
12. Learning new skills			
13. Quick and competent			
14. "Bull in shop"			
15. Does not fatigue			

TOTAL ______ / 30 Control during Movement + ______ / 20 Fine Motor/ Handwriting + ______ / 25 General Coordination = ______ / 75 TOTAL

For Children Ages 5 years 0 months to 7 years 11 months
15-46 indication of DCD or suspect DCD
47-75 probably not DCD

For Children Ages 8 years 0 months to 9 years 11 months
15-55 indication of DCD or suspect DCD
56-75 probably not DCD

For Children Ages 10 years 0 months to 15 years
15-57 indication of DCD or suspect DCD
58-75 probably not DCD

 www.dcdq.ca

APPENDIX 19 -
SELF PERCEPTION PROFILE FOR CHILDREN
(TEACHER VERSION)

Teacher's Rating Scale of Child's Actual Behavior

(Parallels the Self-Perception Profile for Children)

Child's Name____________________________Child's Grade______Rater __________________

For each child, please indicate what you feel to be his/her actual competence on each question, in your opinion. First decide what kind of child he or she is like—the one described on the left or right—then indicate whether this is just sort of true or really true for that individual. Thus, for each item, check *one* of four boxes.

	Really True	Sort of True				Sort of True	Really True
1.	☐	☐	This child is really good at his/her school work	OR	This child can't do the school work assigned	☐	☐
2.	☐	☐	This child finds it hard to make friends	OR	For this child it's pretty easy	☐	☐
3.	☐	☐	This child does really well at all kinds of sports	OR	This child isn't very good when it comes to sports	☐	☐
4.	☐	☐	This child is good looking	OR	This child is not very good looking	☐	☐
5.	☐	☐	This child is usually well-behaved	OR	This child is often not well-behaved	☐	☐
6.	☐	☐	This child often forgets what (s)he learns	OR	This child can remember things easily	☐	☐
7.	☐	☐	This child has social skills to make friends	OR	This child doesn't have social skills to make friends	☐	☐
8.	☐	☐	This child is better than others his/her age at sports	OR	This child can't play as well	☐	☐
9.	☐	☐	This child has a nice physical appearance	OR	This child doesn't have such a nice physical appearance	☐	☐
10.	☐	☐	This child usually acts appropriately	OR	This child would be better if (s)he acted differently	☐	☐
11.	☐	☐	This child has trouble figuring out the answers in school	OR	This child almost always can figure out the answers	☐	☐
12.	☐	☐	This child knows how to become popular	OR	This child does not know how to become popular	☐	☐
13.	☐	☐	This child doesn't do well at new outdoor games	OR	This child is good at new games right away	☐	☐
14.	☐	☐	This child isn't very good looking	OR	This child is pretty good looking	☐	☐
15.	☐	☐	This child often gets in trouble because of things (s)he does	OR	This child usually doesn't do things that get him/her in trouble	☐	☐

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APPENDIX 20 -

SOCIAL SKILLS QUESTIONNAIRE (PARENTS)

SOCIAL SKILLS QUESTIONNAIRE (PARENTS).

DATE: YOUNG PERSON'S NAME: HIS/HER SEX:
GRADE: SCHOOL: HIS/HER AGE:
NAME OF PARENT COMPLETING THE FORM:

Please put a circle around the rating which best describes the young person over the past 4 weeks. Please circle the **0 if the item is not true of him/her**. Circle the number **1 if the item is sometimes true**. If the item is **mostly true of him/her then circle the number 2**. Please answer all items.

0=not true, 1=sometimes true, 2= mostly true

1. Listens to other people's points of view during arguments	0	1	2
2. Makes requests from parents in a polite way	0	1	2
3. Controls his/her temper when he/she loses in a game or competition	0	1	2
4. Reacts appropriately if other kids tease him/her or say unkind things	0	1	2
5. Asks to join in activities with other kids in an appropriate manner	0	1	2
6. Expresses affection or positive feelings to others	0	1	2
7. Does kind things for others voluntarily	0	1	2
8. Gives compliments or says nice things to others when appropriate	0	1	2
9. Controls his/her temper when told off or criticized by parents	0	1	2
10. Asks permission before borrowing or using other people's things	0	1	2
11. Shares things with other kids his/her age	0	1	2
12. Controls his/her temper during disagreements with other kids	0	1	2
13. Asks other kids if he/she may join in their activities	0	1	2
14. Has an appropriate facial expression (eg. not excessive grinning or aggressive)	0	1	2
15. Apologizes when he/she does something wrong	0	1	2
16. Joins in family activities	0	1	2
17. Invites others to join in games or activities	0	1	2
18. Tells a parent if he/she has a problem or needs help	0	1	2
19. Expresses sympathy or concern to others who are hurt or upset	0	1	2
20. Follows the rules in games or activities	0	1	2
21. Takes part in social or sporting activities with other youngsters	0	1	2
22. Takes part in conversations with adults	0	1	2
23. Makes eye contact appropriately with others during conversations	0	1	2
24. His/her tone of voice is appropriate (eg. not aggressive or unusual)	0	1	2
25. Controls his/her temper when he/she does not get his/her own way with parents	0	1	2
26. Laughs or smiles when appropriate	0	1	2
27. Takes part in conversations with other kids	0	1	2
28. Shows that he/she is listening to others during conversations	0	1	2
29. Can express his/her feelings of anger but without losing his/her temper	0	1	2
30. Stands up for him/herself appropriately if other kids act unreasonably	0	1	2

APPENDIX 21 -

SOCIAL COMMUNICATION QUESTIONNAIRE

(SCQ)

1. Is she/he now able to talk using short phrases or sentences? If *no*, skip to question 8. .... yes no

2. Can you have a to and fro "conversation" with her/him that involves taking turns or building on what you have said? .... yes no

3. Has she/he ever used odd phrases or said the same thing over and over in almost exactly the same way (either phrases that she/he has heard other people use or ones that she/he has made up)? .... yes no

4. Has she/he ever used socially inappropriate questions or statements? For example, has she/he ever regularly asked personal questions or made personal comments at awkward times? .... yes no

5. Has she/he ever got her/his pronouns mixed up (e.g., saying *you* or *she/he* for *I*)? .... yes no

6. Has she/he ever used words that she/he seemed to have invented or made up her/himself; put things in odd, indirect ways; or used metaphorical ways of saying things (e.g., saying *hot rain* for *steam*)? .... yes no

7. Has she/he ever said the same thing over and over in exactly the same way or insisted that you say the same thing over and over again? .... yes no

8. Has she/he ever had things that she/he seemed to have to do in a very particular way or order or rituals that she/he insisted that you go through? .... yes no

9. Has her/his facial expression usually seemed appropriate to the particular situation, as far as you could tell? .... yes no

10. Has she/he ever used your hand like a tool or as if it were part of her/his own body (e.g., pointing with your finger, putting your hand on a doorknob to get you to open the door)? .... yes no

11. Has she/he ever had any interests that preoccupy her/him and might seem odd to other people (e.g., traffic lights, drainpipes, or timetables)? .... yes no

12. Has she/he ever seemed to be more interested in parts of a toy or an object (e.g., spinning the wheels of a car), rather than using the object as it was intended? .... yes no

13. Has she/he ever had any special interests that were *unusual* in their intensity but otherwise appropriate for her/his age and peer group (e.g., trains, dinosaurs)? .... yes no

14. Has she/he ever seemed to be *unusually* interested in the sight, feel, sound, taste, or smell of things or people? .... yes no

15. Has she/he ever had any mannerisms or odd ways of moving her/his hands or fingers, such as flapping or moving her/his fingers in front of her/his eyes? .... yes no

16. Has she/he ever had any complicated movements of her/his whole body, such as spinning or repeatedly bouncing up and down? .... yes no

17. Has she/he ever injured her/himself deliberately, such as by biting her/his arm or banging her/his head? .... yes no

18. Has she/he ever had any objects (*other* than a soft toy or comfort blanket) that she/he *had* to carry around? .... yes no

19. Does she/he have any particular friends or a best friend? .... yes no

LIFETIME

Social Communication Questionnaire (SCQ)

AutoScore™ Form

Michael Rutter, M.D., F.R.S., Anthony Bailey, M.D., Sibel Kazak Berument, Ph.D., Catherine Lord, Ph.D., and Andrew Pickles, Ph.D.

wps.
Test with Confidence

Name of Subject ____________

Date of Birth ____________

Date of Interview ____________

Chronological Age ____________ ____F ____M Gender

Name of Respondent ____________

Relation to Subject ____________

Clinician Name ____________

School/Clinic ____________

Directions

Thank you for taking the time to complete this questionnaire. Please answer each question by circling *yes* or *no*. A few questions ask about several related types of behavior; please circle *yes* if *any* of these behaviors have ever been present. Although you may be uncertain about whether some behaviors were ever present or not, please answer *yes* or *no* to every question on the basis of what you think.

Additional copies of this form may be purchased from WPS. Please contact us at 800-648-8857 or wpspublish.com.

4 5 6 7 8 9
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APPENDIX 22 -

DEBRIEF LETTER JANUARY 2015

Ms Melanie Morgan-Jones Telephone +44 01488 648741 E-mail: melmj@btinternet.com	UNIVERSITY OF BATH **Department of Health** Bath BA2 7AY · United Kingdom

Debrief Letter

Project title: Does Fascia Bowen Therapy Improve Neuromuscular Function and Psychological Well-Being in Males Aged 8-11 (At Primary School) with Dyspraxia/Developmental Coordination Disorder

Thank you for taking part in the above study. Your involvement was greatly appreciated. The aim of the research was to investigate a complementary and alternative therapy called Fascia Bowen and its effects on neuromuscular function and psychological wellbeing in boys at primary school with dyspraxia/developmental coordination disorder, over 6 weeks' intervention. It is expected that the therapy will improve neuromuscular function, as that is what it specifically targets, although it's unknown whether any changes might also improve psychological and social wellbeing.

Further information about Fascia Bowen therapy is available on the following website:

http://www.bowen-therapy.co/Bowen/kidsclinic/glamorgan.html

If you have any further questions about the research please ask now, or you can contact me or my supervisors using the information below.

With grateful thanks to all who participated,

Melanie Morgan-Jones

Professional Doctorate student in Health
melmj@btinternet.com

Supervisor
Dr. Chris Ashwin
c.ashwin@bath.ac.uk

Dr Fiona Knott
f.j.knott@reading.ac.uk

APPENDIX 23 -

SPSS OUTPUTS

DCDC MANOVA

```
GLM DCDQpreCM DCDQpostCM DCDQpreCOOR DCDQpostCOOR DCDQpreH DCDQpostH
  /WSFACTOR=Time 2 Repeated
  /MEASURE=Controlmovement coordination handwriting
  /METHOD=SSTYPE(3)
  /EMMEANS=TABLES(Time) COMPARE ADJ(BONFERRONI)
  /EMMEANS=TABLES(OVERALL)
  /PRINT=DESCRIPTIVE ETASQ PARAMETER HOMOGENEITY
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=Time.
```

General Linear Model

Notes

Output Created		19-JUL-2014 12:55:43
Comments		
Input	Data	C:\Users\Melanie Morgan Jones\Documents\ABC Doctorate Documents\PHASE 3\Thesis\data analysis\Thesis data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	10
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the model.
Syntax		GLM DCDQpreCM DCDQpostCM DCDQpreCOOR DCDQpostCOOR DCDQpreH DCDQpostH /WSFACTOR=Time 2 Repeated /MEASURE=Controlmovement coordination handwriting /METHOD=SSTYPE(3) /EMMEANS=TABLES(Time) COMPARE ADJ(BONFERRONI) /EMMEANS=TABLES(OVERALL) /PRINT=DESCRIPTIVE ETASQ...
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.03

```
[DataSet1] C:\Users\Melanie Morgan Jones\Documents\ABC Doctorate Documents
\PHASE 3\Thesis\data analysis\Thesis data.sav
```

Warnings

The HOMOGENEITY specification in the PRINT subcommand will be ignored because there are no between-subjects factors.

Within-Subjects Factors

Measure	Time	Dependent Variable
Controlmovement	1	DCDQpreCM
	2	DCDQpostCM
coordination	1	DCDQpreCOOR
	2	DCDQpostCOOR
handwriting	1	DCDQpreH
	2	DCDQpostH

Descriptive Statistics

	Mean	Std. Deviation	N
DCDQ pre control movement	15.5000	2.75882	10
DCDQ post control movement	19.5000	3.77859	10
DCDQ pre coordination	11.2000	2.29976	10
DCDQ post coordination	12.7000	3.86005	10
DCDQ pre handwriting	10.3000	3.40098	10
DCDQ post handwriting	10.7000	2.40601	10

Multivariate Tests[a]

Effect			Value	F	Hypothesis df
Between Subjects	Intercept	Pillai's Trace	.993	331.056[b]	3.000
		Wilks' Lambda	.007	331.056[b]	3.000
		Hotelling's Trace	141.881	331.056[b]	3.000
		Roy's Largest Root	141.881	331.056[b]	3.000
Within Subjects	Time	Pillai's Trace	.588	3.329[b]	3.000
		Wilks' Lambda	.412	3.329[b]	3.000
		Hotelling's Trace	1.427	3.329[b]	3.000
		Roy's Largest Root	1.427	3.329[b]	3.000

Multivariate Tests[a]

Effect			Error df	Sig.	Partial Eta Squared
Between Subjects	Intercept	Pillai's Trace	7.000	.000	.993
		Wilks' Lambda	7.000	.000	.993
		Hotelling's Trace	7.000	.000	.993
		Roy's Largest Root	7.000	.000	.993
Within Subjects	Time	Pillai's Trace	7.000	.086	.588
		Wilks' Lambda	7.000	.086	.588
		Hotelling's Trace	7.000	.086	.588
		Roy's Largest Root	7.000	.086	.588

a. Design: Intercept
Within Subjects Design: Time

b. Exact statistic

Mauchly's Test of Sphericity[a]

Within Subjects Effect	Measure	Mauchly's W	Approx. Chi-Square	df	Sig.
Time	Controlmovement	1.000	.000	0	.
	coordination	1.000	.000	0	.
	handwriting	1.000	.000	0	.

Mauchly's Test of Sphericity[a]

Within Subjects Effect	Measure	Epsilon[b]		
		Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	Controlmovement	1.000	1.000	1.000
	coordination	1.000	1.000	1.000
	handwriting	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Multivariate[a,b]

Within Subjects Effect		Value	F	Hypothesis df	Error df	Sig.
Time	Pillai's Trace	.588	3.329[c]	3.000	7.000	.086
	Wilks' Lambda	.412	3.329[c]	3.000	7.000	.086
	Hotelling's Trace	1.427	3.329[c]	3.000	7.000	.086
	Roy's Largest Root	1.427	3.329[c]	3.000	7.000	.086

Multivariate[a,b]

Within Subjects Effect		Partial Eta Squared
Time	Pillai's Trace	.588
	Wilks' Lambda	.588
	Hotelling's Trace	.588
	Roy's Largest Root	.588

a. Design: Intercept
Within Subjects Design: Time

b. Tests are based on averaged variables.

c. Exact statistic

Univariate Tests

Source	Measure		Type III Sum of Squares	df	Mean Square
Time	Controlmovement	Sphericity Assumed	80.000	1	80.000
		Greenhouse-Geisser	80.000	1.000	80.000
		Huynh-Feldt	80.000	1.000	80.000
		Lower-bound	80.000	1.000	80.000
	coordination	Sphericity Assumed	11.250	1	11.250
		Greenhouse-Geisser	11.250	1.000	11.250
		Huynh-Feldt	11.250	1.000	11.250
		Lower-bound	11.250	1.000	11.250
	handwriting	Sphericity Assumed	.800	1	.800
		Greenhouse-Geisser	.800	1.000	.800
		Huynh-Feldt	.800	1.000	.800
		Lower-bound	.800	1.000	.800
Error(Time)	Controlmovement	Sphericity Assumed	67.000	9	7.444
		Greenhouse-Geisser	67.000	9.000	7.444
		Huynh-Feldt	67.000	9.000	7.444
		Lower-bound	67.000	9.000	7.444
	coordination	Sphericity Assumed	76.250	9	8.472
		Greenhouse-Geisser	76.250	9.000	8.472
		Huynh-Feldt	76.250	9.000	8.472
		Lower-bound	76.250	9.000	8.472
	handwriting	Sphericity Assumed	37.200	9	4.133
		Greenhouse-Geisser	37.200	9.000	4.133
		Huynh-Feldt	37.200	9.000	4.133
		Lower-bound	37.200	9.000	4.133

Univariate Tests

Source	Measure		F	Sig.	Partial Eta Squared
Time	Controlmovement	Sphericity Assumed	10.746	.010	.544
		Greenhouse-Geisser	10.746	.010	.544
		Huynh-Feldt	10.746	.010	.544
		Lower-bound	10.746	.010	.544
	coordination	Sphericity Assumed	1.328	.279	.129
		Greenhouse-Geisser	1.328	.279	.129
		Huynh-Feldt	1.328	.279	.129
		Lower-bound	1.328	.279	.129
	handwriting	Sphericity Assumed	.194	.670	.021
		Greenhouse-Geisser	.194	.670	.021
		Huynh-Feldt	.194	.670	.021
		Lower-bound	.194	.670	.021
Error(Time)	Controlmovement	Sphericity Assumed			
		Greenhouse-Geisser			
		Huynh-Feldt			
		Lower-bound			
	coordination	Sphericity Assumed			
		Greenhouse-Geisser			
		Huynh-Feldt			
		Lower-bound			
	handwriting	Sphericity Assumed			
		Greenhouse-Geisser			
		Huynh-Feldt			
		Lower-bound			

Tests of Within-Subjects Contrasts

Source	Measure	Time	Type III Sum of Squares	df	Mean Square
Time	Controlmovement	Level 1 vs. Level 2	160.000	1	160.000
	coordination	Level 1 vs. Level 2	22.500	1	22.500
	handwriting	Level 1 vs. Level 2	1.600	1	1.600
Error(Time)	Controlmovement	Level 1 vs. Level 2	134.000	9	14.889
	coordination	Level 1 vs. Level 2	152.500	9	16.944
	handwriting	Level 1 vs. Level 2	74.400	9	8.267

Tests of Within-Subjects Contrasts

Source	Measure	Time	F	Sig.	Partial Eta Squared
Time	Controlmovement	Level 1 vs. Level 2	10.746	.010	.544
	coordination	Level 1 vs. Level 2	1.328	.279	.129
	handwriting	Level 1 vs. Level 2	.194	.670	.021
Error(Time)	Controlmovement	Level 1 vs. Level 2			
	coordination	Level 1 vs. Level 2			
	handwriting	Level 1 vs. Level 2			

Tests of Between-Subjects Effects

Transformed Variable: Average

Source	Measure	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	Controlmovement	3062.500	1	3062.500	424.038	.000
	coordination	1428.025	1	1428.025	243.760	.000
	handwriting	1102.500	1	1102.500	166.765	.000
Error	Controlmovement	65.000	9	7.222		
	coordination	52.725	9	5.858		
	handwriting	59.500	9	6.611		

Tests of Between-Subjects Effects

Transformed Variable: Average

Source	Measure	Partial Eta Squared
Intercept	Controlmovement	.979
	coordination	.964
	handwriting	.949
Error	Controlmovement	
	coordination	
	handwriting	

Parameter Estimates

Dependent Variable	Parameter	B	Std. Error	t	Sig.
DCDQ pre control movement	Intercept	15.500	.872	17.767	.000
DCDQ post control movement	Intercept	19.500	1.195	16.319	.000
DCDQ pre coordination	Intercept	11.200	.727	15.401	.000
DCDQ post coordination	Intercept	12.700	1.221	10.404	.000
DCDQ pre handwriting	Intercept	10.300	1.075	9.577	.000
DCDQ post handwriting	Intercept	10.700	.761	14.063	.000

Parameter Estimates

Dependent Variable	Parameter	95% Confidence Interval		Partial Eta Squared
		Lower Bound	Upper Bound	
DCDQ pre control movement	Intercept	13.526	17.474	.972
DCDQ post control movement	Intercept	16.797	22.203	.967
DCDQ pre coordination	Intercept	9.555	12.845	.963
DCDQ post coordination	Intercept	9.939	15.461	.923
DCDQ pre handwriting	Intercept	7.867	12.733	.911
DCDQ post handwriting	Intercept	8.979	12.421	.956

Estimated Marginal Means

1. Time

Estimates

Measure	Time	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Controlmovement	1	15.500	.872	13.526	17.474
	2	19.500	1.195	16.797	22.203
coordination	1	11.200	.727	9.555	12.845
	2	12.700	1.221	9.939	15.461
handwriting	1	10.300	1.075	7.867	12.733
	2	10.700	.761	8.979	12.421

Pairwise Comparisons

Measure	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence[b]...
						Lower Bound
Controlmovement	1	2	-4.000*	1.220	.010	-6.760
	2	1	4.000*	1.220	.010	1.240
coordination	1	2	-1.500	1.302	.279	-4.445
	2	1	1.500	1.302	.279	-1.445
handwriting	1	2	-.400	.909	.670	-2.457
	2	1	.400	.909	.670	-1.657

Pairwise Comparisons

Measure	(I) Time	(J) Time	95% Confidence ...[b] Upper Bound
Controlmovement	1	2	-1.240
	2	1	6.760
coordination	1	2	1.445
	2	1	4.445
handwriting	1	2	1.657
	2	1	2.457

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.588	3.329[a]	3.000	7.000	.086	.588
Wilks' lambda	.412	3.329[a]	3.000	7.000	.086	.588
Hotelling's trace	1.427	3.329[a]	3.000	7.000	.086	.588
Roy's largest root	1.427	3.329[a]	3.000	7.000	.086	.588

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

2. Grand Mean

Measure	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Controlmovement	17.500	.850	15.578	19.422
coordination	11.950	.765	10.219	13.681
handwriting	10.500	.813	8.661	12.339

MABC MANOVA

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  /EMMEANS=TABLES(OVERALL)
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General Linear Model

Notes

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Warnings

The HOMOGENEITY specification in the PRINT subcommand will be ignored because there are no between-subjects factors.

Page 1

Within-Subjects Factors

Measure	Time	Dependent Variable
ManualDexterity	1	MpreMD
	2	MpostMD
AimingCatching	1	MpreAC
	2	MpostAC
Balance	1	MpreB
	2	MpostB

Descriptive Statistics

	Mean	Std. Deviation	N
MABC2pre manual dexterity	4.1500	3.21498	10
MABC2post manual dexterity	15.0000	15.00370	10
MABC2pre aiming and catching	11.4000	11.97405	10
MABC2post aiming and catching	26.8500	22.17863	10
MABC2pre balance	23.0000	21.45797	10
MABC2post balance	55.1000	31.85191	10

Multivariate Tests[a]

Effect			Value	F	Hypothesis df
Between Subjects	Intercept	Pillai's Trace	.793	8.933[b]	3.000
		Wilks' Lambda	.207	8.933[b]	3.000
		Hotelling's Trace	3.828	8.933[b]	3.000
		Roy's Largest Root	3.828	8.933[b]	3.000
Within Subjects	Time	Pillai's Trace	.761	7.435[b]	3.000
		Wilks' Lambda	.239	7.435[b]	3.000
		Hotelling's Trace	3.186	7.435[b]	3.000
		Roy's Largest Root	3.186	7.435[b]	3.000

Multivariate Tests[a]

Effect			Error df	Sig.	Partial Eta Squared
Between Subjects	Intercept	Pillai's Trace	7.000	.009	.793
		Wilks' Lambda	7.000	.009	.793
		Hotelling's Trace	7.000	.009	.793
		Roy's Largest Root	7.000	.009	.793
Within Subjects	Time	Pillai's Trace	7.000	.014	.761
		Wilks' Lambda	7.000	.014	.761
		Hotelling's Trace	7.000	.014	.761
		Roy's Largest Root	7.000	.014	.761

a. Design: Intercept
Within Subjects Design: Time

b. Exact statistic

Mauchly's Test of Sphericity[a]

Within Subjects Effect	Measure	Mauchly's W	Approx. Chi-Square	df	Sig.
Time	ManualDexterity	1.000	.000	0	.
	AimingCatching	1.000	.000	0	.
	Balance	1.000	.000	0	.

Mauchly's Test of Sphericity[a]

Within Subjects Effect	Measure	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	ManualDexterity	1.000	1.000	1.000
	AimingCatching	1.000	1.000	1.000
	Balance	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Multivariate[a,b]

Within Subjects Effect		Value	F	Hypothesis df	Error df	Sig.
Time	Pillai's Trace	.761	7.435[c]	3.000	7.000	.014
	Wilks' Lambda	.239	7.435[c]	3.000	7.000	.014
	Hotelling's Trace	3.186	7.435[c]	3.000	7.000	.014
	Roy's Largest Root	3.186	7.435[c]	3.000	7.000	.014

Multivariate[a,b]

Within Subjects Effect		Partial Eta Squared
Time	Pillai's Trace	.761
	Wilks' Lambda	.761
	Hotelling's Trace	.761
	Roy's Largest Root	.761

a. Design: Intercept
Within Subjects Design: Time

b. Tests are based on averaged variables.

c. Exact statistic

Univariate Tests

Source	Measure		Type III Sum of Squares	df	Mean Square
Time	ManualDexterity	Sphericity Assumed	588.612	1	588.612
		Greenhouse-Geisser	588.612	1.000	588.612
		Huynh-Feldt	588.612	1.000	588.612
		Lower-bound	588.612	1.000	588.612
	AimingCatching	Sphericity Assumed	1193.512	1	1193.512
		Greenhouse-Geisser	1193.512	1.000	1193.512
		Huynh-Feldt	1193.512	1.000	1193.512
		Lower-bound	1193.512	1.000	1193.512
	Balance	Sphericity Assumed	5152.050	1	5152.050
		Greenhouse-Geisser	5152.050	1.000	5152.050
		Huynh-Feldt	5152.050	1.000	5152.050
		Lower-bound	5152.050	1.000	5152.050
Error(Time)	ManualDexterity	Sphericity Assumed	868.512	9	96.501
		Greenhouse-Geisser	868.512	9.000	96.501
		Huynh-Feldt	868.512	9.000	96.501
		Lower-bound	868.512	9.000	96.501
	AimingCatching	Sphericity Assumed	1294.112	9	143.790
		Greenhouse-Geisser	1294.112	9.000	143.790
		Huynh-Feldt	1294.112	9.000	143.790
		Lower-bound	1294.112	9.000	143.790
	Balance	Sphericity Assumed	3183.450	9	353.717
		Greenhouse-Geisser	3183.450	9.000	353.717
		Huynh-Feldt	3183.450	9.000	353.717
		Lower-bound	3183.450	9.000	353.717

Univariate Tests

Source	Measure		F	Sig.	Partial Eta Squared
Time	ManualDexterity	Sphericity Assumed	6.100	.036	.404
		Greenhouse-Geisser	6.100	.036	.404
		Huynh-Feldt	6.100	.036	.404
		Lower-bound	6.100	.036	.404
	AimingCatching	Sphericity Assumed	8.300	.018	.480
		Greenhouse-Geisser	8.300	.018	.480
		Huynh-Feldt	8.300	.018	.480
		Lower-bound	8.300	.018	.480
	Balance	Sphericity Assumed	14.565	.004	.618
		Greenhouse-Geisser	14.565	.004	.618
		Huynh-Feldt	14.565	.004	.618
		Lower-bound	14.565	.004	.618
Error(Time)	ManualDexterity	Sphericity Assumed			
		Greenhouse-Geisser			
		Huynh-Feldt			
		Lower-bound			
	AimingCatching	Sphericity Assumed			
		Greenhouse-Geisser			
		Huynh-Feldt			
		Lower-bound			
	Balance	Sphericity Assumed			
		Greenhouse-Geisser			
		Huynh-Feldt			
		Lower-bound			

Tests of Within-Subjects Contrasts

Source	Measure	Time	Type III Sum of Squares	df	Mean Square
Time	ManualDexterity	Level 1 vs. Level 2	1177.225	1	1177.225
	AimingCatching	Level 1 vs. Level 2	2387.025	1	2387.025
	Balance	Level 1 vs. Level 2	10304.100	1	10304.100
Error(Time)	ManualDexterity	Level 1 vs. Level 2	1737.025	9	193.003
	AimingCatching	Level 1 vs. Level 2	2588.225	9	287.581
	Balance	Level 1 vs. Level 2	6366.900	9	707.433

Tests of Within-Subjects Contrasts

Source	Measure	Time	F	Sig.	Partial Eta Squared
Time	ManualDexterity	Level 1 vs. Level 2	6.100	.036	.404
	AimingCatching	Level 1 vs. Level 2	8.300	.018	.480
	Balance	Level 1 vs. Level 2	14.565	.004	.618
Error(Time)	ManualDexterity	Level 1 vs. Level 2			
	AimingCatching	Level 1 vs. Level 2			
	Balance	Level 1 vs. Level 2			

Tests of Between-Subjects Effects

Transformed Variable: Average

Source	Measure	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	ManualDexterity	916.806	1	916.806	13.197	.005
	AimingCatching	3657.656	1	3657.656	14.884	.004
	Balance	15249.025	1	15249.025	27.200	.001
Error	ManualDexterity	625.256	9	69.473		
	AimingCatching	2211.656	9	245.740		
	Balance	5045.725	9	560.636		

Tests of Between-Subjects Effects

Transformed Variable: Average

Source	Measure	Partial Eta Squared
Intercept	ManualDexterity	.595
	AimingCatching	.623
	Balance	.751
Error	ManualDexterity	
	AimingCatching	
	Balance	

Parameter Estimates

Dependent Variable	Parameter	B	Std. Error	t	Sig.
MABC2pre manual dexterity	Intercept	4.150	1.017	4.082	.003
MABC2post manual dexterity	Intercept	15.000	4.745	3.161	.012
MABC2pre aiming and catching	Intercept	11.400	3.787	3.011	.015
MABC2post aiming and catching	Intercept	26.850	7.013	3.828	.004
MABC2pre balance	Intercept	23.000	6.786	3.390	.008
MABC2post balance	Intercept	55.100	10.072	5.470	.000

Parameter Estimates

Dependent Variable	Parameter	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound	Partial Eta Squared
MABC2pre manual dexterity	Intercept	1.850	6.450	.649
MABC2post manual dexterity	Intercept	4.267	25.733	.526
MABC2pre aiming and catching	Intercept	2.834	19.966	.502
MABC2post aiming and catching	Intercept	10.984	42.716	.620
MABC2pre balance	Intercept	7.650	38.350	.561
MABC2post balance	Intercept	32.315	77.885	.769

Estimated Marginal Means

1. Time

Estimates

Measure	Time	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
ManualDexterity	1	4.150	1.017	1.850	6.450
	2	15.000	4.745	4.267	25.733
AimingCatching	1	11.400	3.787	2.834	19.966
	2	26.850	7.013	10.984	42.716
Balance	1	23.000	6.786	7.650	38.350
	2	55.100	10.072	32.315	77.885

Pairwise Comparisons

Measure	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence[b] ... Lower Bound
ManualDexterity	1	2	-10.850*	4.393	.036	-20.788
	2	1	10.850*	4.393	.036	.912
AimingCatching	1	2	-15.450*	5.363	.018	-27.581
	2	1	15.450*	5.363	.018	3.319
Balance	1	2	-32.100*	8.411	.004	-51.127
	2	1	32.100*	8.411	.004	13.073

Pairwise Comparisons

Measure	(I) Time	(J) Time	95% Confidence ...[b] Upper Bound
ManualDexterity	1	2	-.912
	2	1	20.788
AimingCatching	1	2	-3.319
	2	1	27.581
Balance	1	2	-13.073
	2	1	51.127

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.761	7.435[a]	3.000	7.000	.014	.761
Wilks' lambda	.239	7.435[a]	3.000	7.000	.014	.761
Hotelling's trace	3.186	7.435[a]	3.000	7.000	.014	.761
Roy's largest root	3.186	7.435[a]	3.000	7.000	.014	.761

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

2. Grand Mean

Measure	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
ManualDexterity	9.575	2.636	3.612	15.538
AimingCatching	19.125	4.957	7.911	30.339
Balance	39.050	7.488	22.112	55.988

Prosocial SDQ Mixed ANOVA

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 /EMMEANS=TABLES(OVERALL)
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General Linear Model

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	Cases Used	Statistics are based on all cases with valid data for all variables in the model.
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Warnings

The HOMOGENEITY specification in the PRINT subcommand will be ignored because there are no between-subjects factors.

Within-Subjects Factors

Measure: ProsocialSDQ

Respondent	Time	Dependent Variable
1	1	SDQteaPREpro
	2	SDQteaPOSTpro
2	1	SDQparPREpro
	2	SDQparPOSTpro

Descriptive Statistics

	Mean	Std. Deviation	N
SDQ teacher pre prosocial behaviour	6.5000	2.83823	10
SDQ teacher post prosocial	4.3000	2.71006	10
SDQ parent pre prosocial	6.7000	3.12872	10
SDQ parent post prosocial	6.1000	3.66515	10

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Respondent	Pillai's Trace	.126	1.295[b]	1.000	9.000	.285	.126
	Wilks' Lambda	.874	1.295[b]	1.000	9.000	.285	.126
	Hotelling's Trace	.144	1.295[b]	1.000	9.000	.285	.126
	Roy's Largest Root	.144	1.295[b]	1.000	9.000	.285	.126
Time	Pillai's Trace	.260	3.156[b]	1.000	9.000	.109	.260
	Wilks' Lambda	.740	3.156[b]	1.000	9.000	.109	.260
	Hotelling's Trace	.351	3.156[b]	1.000	9.000	.109	.260
	Roy's Largest Root	.351	3.156[b]	1.000	9.000	.109	.260
Respondent * Time	Pillai's Trace	.366	5.189[b]	1.000	9.000	.049	.366
	Wilks' Lambda	.634	5.189[b]	1.000	9.000	.049	.366
	Hotelling's Trace	.577	5.189[b]	1.000	9.000	.049	.366
	Roy's Largest Root	.577	5.189[b]	1.000	9.000	.049	.366

a. Design: Intercept
Within Subjects Design: Respondent + Time + Respondent * Time

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: ProsocialSDQ

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Respondent	1.000	.000	0	.	1.000	1.000	1.000
Time	1.000	.000	0	.	1.000	1.000	1.000
Respondent * Time	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: Respondent + Time + Respondent * Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: ProsocialSDQ

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Respondent	Sphericity Assumed	10.000	1	10.000	1.295	.285	.126
	Greenhouse-Geisser	10.000	1.000	10.000	1.295	.285	.126
	Huynh-Feldt	10.000	1.000	10.000	1.295	.285	.126
	Lower-bound	10.000	1.000	10.000	1.295	.285	.126
Error(Respondent)	Sphericity Assumed	69.500	9	7.722			
	Greenhouse-Geisser	69.500	9.000	7.722			
	Huynh-Feldt	69.500	9.000	7.722			
	Lower-bound	69.500	9.000	7.722			
Time	Sphericity Assumed	19.600	1	19.600	3.156	.109	.260
	Greenhouse-Geisser	19.600	1.000	19.600	3.156	.109	.260
	Huynh-Feldt	19.600	1.000	19.600	3.156	.109	.260
	Lower-bound	19.600	1.000	19.600	3.156	.109	.260
Error(Time)	Sphericity Assumed	55.900	9	6.211			
	Greenhouse-Geisser	55.900	9.000	6.211			
	Huynh-Feldt	55.900	9.000	6.211			
	Lower-bound	55.900	9.000	6.211			
Respondent * Time	Sphericity Assumed	6.400	1	6.400	5.189	.049	.366
	Greenhouse-Geisser	6.400	1.000	6.400	5.189	.049	.366
	Huynh-Feldt	6.400	1.000	6.400	5.189	.049	.366
	Lower-bound	6.400	1.000	6.400	5.189	.049	.366
Error(Respondent*Time)	Sphericity Assumed	11.100	9	1.233			
	Greenhouse-Geisser	11.100	9.000	1.233			
	Huynh-Feldt	11.100	9.000	1.233			
	Lower-bound	11.100	9.000	1.233			

Tests of Within-Subjects Contrasts

Measure: ProsocialSDQ

Source	Respondent	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Respondent	Level 1 vs. Level 2		10.000	1	10.000	1.295	.285	.126
Error(Respondent)	Level 1 vs. Level 2		69.500	9	7.722			
Time		Level 1 vs. Level 2	19.600	1	19.600	3.156	.109	.260
Error(Time)		Level 1 vs. Level 2	55.900	9	6.211			
Respondent * Time	Level 1 vs. Level 2	Level 1 vs. Level 2	25.600	1	25.600	5.189	.049	.366
Error(Respondent*Time)	Level 1 vs. Level 2	Level 1 vs. Level 2	44.400	9	4.933			

Tests of Between-Subjects Effects

Measure: ProsocialSDQ

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	348.100	1	348.100	59.363	.000	.868
Error	52.775	9	5.864			

Parameter Estimates

Dependent Variable	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound	Partial Eta Squared
SDQ teacher pre prosocial behaviour	Intercept	6.500	.898	7.242	.000	4.470	8.530	.854
SDQ teacher post prosocial	Intercept	4.300	.857	5.018	.001	2.361	6.239	.737
SDQ parent pre prosocial	Intercept	6.700	.989	6.772	.000	4.462	8.938	.836
SDQ parent post prosocial	Intercept	6.100	1.159	5.263	.001	3.478	8.722	.755

Estimated Marginal Means

1. Time

Estimates

Measure: ProsocialSDQ

Time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	6.600	.843	4.694	8.506
2	5.200	.879	3.211	7.189

Pairwise Comparisons

Measure: ProsocialSDQ

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
1	2	1.400	.788	.109	-.383	3.183
2	1	-1.400	.788	.109	-3.183	.383

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.260	3.156[a]	1.000	9.000	.109	.260
Wilks' lambda	.740	3.156[a]	1.000	9.000	.109	.260
Hotelling's trace	.351	3.156[a]	1.000	9.000	.109	.260
Roy's largest root	.351	3.156[a]	1.000	9.000	.109	.260

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

2. Grand Mean

Measure: ProsocialSDQ

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
5.900	.766	4.168	7.632

3. Respondent

Estimates

Measure: ProsocialSDQ

Respondent	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	5.400	.781	3.633	7.167
2	6.400	.974	4.196	8.604

Pairwise Comparisons

Measure: ProsocialSDQ

(I) Respondent	(J) Respondent	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
1	2	-1.000	.879	.285	-2.988	.988
2	1	1.000	.879	.285	-.988	2.988

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.126	1.295[a]	1.000	9.000	.285	.126
Wilks' lambda	.874	1.295[a]	1.000	9.000	.285	.126
Hotelling's trace	.144	1.295[a]	1.000	9.000	.285	.126
Roy's largest root	.144	1.295[a]	1.000	9.000	.285	.126

Each F tests the multivariate effect of Respondent. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

4. Time * Respondent

Measure: ProsocialSDQ

Time	Respondent	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1	1	6.500	.898	4.470	8.530
	2	6.700	.989	4.462	8.938
2	1	4.300	.857	2.361	6.239
	2	6.100	1.159	3.478	8.722

SDQ Prosocial Location ANOVA

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General Linear Model

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Within-Subjects Factors

Measure: ProSocialSDQ

Time	Dependent Variable
1	SDQteaPREpro
2	SDQteaPOSTpro

Between-Subjects Factors

		Value Label	N
Location of Intervention	1.00	School	4
	2.00	Clinic	6

Descriptive Statistics

	Location of Intervention	Mean	Std. Deviation	N
SDQ teacher pre prosocial behaviour	School	7.7500	2.06155	4
	Clinic	5.6667	3.14113	6
	Total	6.5000	2.83823	10
SDQ teacher post prosocial	School	6.0000	3.26599	4
	Clinic	3.1667	1.72240	6
	Total	4.3000	2.71006	10

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Time	Pillai's Trace	.435	6.165[b]	1.000	8.000	.038
	Wilks' Lambda	.565	6.165[b]	1.000	8.000	.038
	Hotelling's Trace	.771	6.165[b]	1.000	8.000	.038
	Roy's Largest Root	.771	6.165[b]	1.000	8.000	.038
Time * Location	Pillai's Trace	.023	.192[b]	1.000	8.000	.673
	Wilks' Lambda	.977	.192[b]	1.000	8.000	.673
	Hotelling's Trace	.024	.192[b]	1.000	8.000	.673
	Roy's Largest Root	.024	.192[b]	1.000	8.000	.673

Multivariate Tests[a]

Effect		Partial Eta Squared
Time	Pillai's Trace	.435
	Wilks' Lambda	.435
	Hotelling's Trace	.435
	Roy's Largest Root	.435
Time * Location	Pillai's Trace	.023
	Wilks' Lambda	.023
	Hotelling's Trace	.023
	Roy's Largest Root	.023

a. Design: Intercept + Location
Within Subjects Design: Time

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: ProSocialSDQ

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
Time	1.000	.000	0	.	1.000

Mauchly's Test of Sphericity[a]

Measure: ProSocialSDQ

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
Time	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept + Location
Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: ProSocialSDQ

Source		Type III Sum of Squares	df	Mean Square	F
Time	Sphericity Assumed	21.675	1	21.675	6.165
	Greenhouse-Geisser	21.675	1.000	21.675	6.165
	Huynh-Feldt	21.675	1.000	21.675	6.165
	Lower-bound	21.675	1.000	21.675	6.165
Time * Location	Sphericity Assumed	.675	1	.675	.192
	Greenhouse-Geisser	.675	1.000	.675	.192
	Huynh-Feldt	.675	1.000	.675	.192
	Lower-bound	.675	1.000	.675	.192
Error(Time)	Sphericity Assumed	28.125	8	3.516	
	Greenhouse-Geisser	28.125	8.000	3.516	
	Huynh-Feldt	28.125	8.000	3.516	
	Lower-bound	28.125	8.000	3.516	

Tests of Within-Subjects Effects

Measure: ProSocialSDQ

Source		Sig.	Partial Eta Squared
Time	Sphericity Assumed	.038	.435
	Greenhouse-Geisser	.038	.435
	Huynh-Feldt	.038	.435
	Lower-bound	.038	.435
Time * Location	Sphericity Assumed	.673	.023
	Greenhouse-Geisser	.673	.023
	Huynh-Feldt	.673	.023
	Lower-bound	.673	.023
Error(Time)	Sphericity Assumed		
	Greenhouse-Geisser		
	Huynh-Feldt		
	Lower-bound		

Tests of Within-Subjects Contrasts

Measure: ProSocialSDQ

Source	Time	Type III Sum of Squares	df	Mean Square	F
Time	Level 1 vs. Level 2	43.350	1	43.350	6.165
Time * Location	Level 1 vs. Level 2	1.350	1	1.350	.192
Error(Time)	Level 1 vs. Level 2	56.250	8	7.031	

Tests of Within-Subjects Contrasts

Measure: ProSocialSDQ

Source	Time	Sig.	Partial Eta Squared
Time	Level 1 vs. Level 2	.038	.435
Time * Location	Level 1 vs. Level 2	.673	.023
Error(Time)	Level 1 vs. Level 2		

Tests of Between-Subjects Effects

Measure: ProSocialSDQ

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	306.004	1	306.004	60.601	.000	.883
Location	14.504	1	14.504	2.872	.129	.264
Error	40.396	8	5.049			

Custom Hypothesis Tests

Contrast Results (K Matrix)

Location of Intervention Repeated Contrast			Averaged Variable ProSocialSDQ
Level 1 vs. Level 2	Contrast Estimate		2.458
	Hypothesized Value		0
	Difference (Estimate - Hypothesized)		2.458
	Std. Error		1.450
	Sig.		.129
	95% Confidence Interval for Difference	Lower Bound	-.887
		Upper Bound	5.803

Test Results

Measure: ProSocialSDQ

Transformed Variable: AVERAGE

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	14.504	1	14.504	2.872	.129	.264
Error	40.396	8	5.049			

Estimated Marginal Means

1. Grand Mean

Measure: ProSocialSDQ

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
5.646	.725	3.973	7.318

2. Location of Intervention

Estimates

Measure: ProSocialSDQ

Location of Intervention	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
School	6.875	1.124	4.284	9.466
Clinic	4.417	.917	2.301	6.532

Pairwise Comparisons

Measure: ProSocialSDQ

(I) Location of Intervention	(J) Location of Intervention	Mean Difference (I-J)	Std. Error	Sig.[a]
School	Clinic	2.458	1.450	.129
Clinic	School	-2.458	1.450	.129

Pairwise Comparisons

Measure: ProSocialSDQ

(I) Location of Intervention	(J) Location of Intervention	95% Confidence Interval for Difference[a]	
		Lower Bound	Upper Bound
School	Clinic	-.887	5.803
Clinic	School	-5.803	.887

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

Measure: ProSocialSDQ

	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	14.504	1	14.504	2.872	.129	.264
Error	40.396	8	5.049			

The F tests the effect of Location of Intervention. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

3. Time

Estimates

Measure: ProSocialSDQ

Time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	6.708	.899	4.635	8.782
2	4.583	.781	2.783	6.384

Pairwise Comparisons

Measure: ProSocialSDQ

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
1	2	2.125*	.856	.038	.151	4.099
2	1	-2.125*	.856	.038	-4.099	-.151

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.435	6.165[a]	1.000	8.000	.038	.435
Wilks' lambda	.565	6.165[a]	1.000	8.000	.038	.435
Hotelling's trace	.771	6.165[a]	1.000	8.000	.038	.435
Roy's largest root	.771	6.165[a]	1.000	8.000	.038	.435

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

4. Location of Intervention * Time

Measure: ProSocialSDQ

Location of Intervention	Time	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
School	1	7.750	1.393	4.538	10.962
	2	6.000	1.210	3.210	8.790
Clinic	1	5.667	1.137	3.044	8.289
	2	3.167	.988	.889	5.444

SDQ Teacher Pre Post T-Test

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T-Test

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Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	SDQ teacher pre prosocial behaviour	6.5000	10	2.83823	.89753
	SDQ teacher post prosocial	4.3000	10	2.71006	.85700

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	SDQ teacher pre prosocial behaviour & SDQ teacher post prosocial	10	.585	.076

Paired Samples Test

		Paired Differences			
		Mean	Std. Deviation	Std. Error Mean	95% Confidence ... Lower
Pair 1	SDQ teacher pre prosocial behaviour - SDQ teacher post prosocial	2.20000	2.52982	.80000	.39027

Paired Samples Test

		Paired ... 95% Confidence ... Upper	t	df	Sig. (2-tailed)
Pair 1	SDQ teacher pre prosocial behaviour - SDQ teacher post prosocial	4.00973	2.750	9	.022

SPP MANOVA

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General Linear Model

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Page 1

Notes

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Warnings

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Within-Subjects Factors

Measure	Time	Respondent	Dependent Variable
Scholasticcomp	1	1	SPPparPREsch
		2	SPPpuPREsch
	2	1	SPPparPOSTsch
		2	SPPpuPOSTsch
Socialaccep	1	1	SPPparPREsoc
		2	SPPpuPREsoc
	2	1	SPPparPOSTsoc
		2	SPPpuPOSTsoc
athletcomp	1	1	SPPparPREac
		2	SPPpuPREac
	2	1	SPPparPOSTac
		2	SPPpuPOSTac
physicapp	1	1	SPPparPREpa
		2	SPPpuPREpa
	2	1	SPPparPOSTpa
		2	SPPpuPOSTpa
behavconduct	1	1	SPPparPREbc
		2	SPPpuPREbc
	2	1	SPPparPOSTbc
		2	SPPpuPOSTbc

Descriptive Statistics

	Mean	Std. Deviation	N
SPP parent pre scholastic competence	2.6300	1.10156	10
SPP pupil pre scholastic competence	2.3300	.64472	10
SPP parent post scholastic competence	2.7400	.96862	10
SPP pupil post scholastic competence	2.6000	.69282	10
SPP parent pre social competence	2.0800	.65286	10
SPP pupil pre social competence	2.7100	.53219	10
SPP parent post social acceptance	2.3100	.59712	10
SPP pupil post social competence	2.7500	.81684	10
SPP parent pre athletic competence	1.6400	.64670	10
SPP pupil pre athletic competence	2.1600	.74863	10
SPP parent post athletic competence	1.6800	.78145	10
SPP pupil post athletic competence	2.6600	.64670	10
SPP parent pre physical appreance	3.8800	.19322	10
SPP pupil pre physical apprearance	2.8800	.45412	10
SPP parent post physical apprearance	3.8600	.32728	10
SPP pupil post physical appearance	3.1800	.70522	10
SPP parent pre behavioural conduct	2.9000	.57349	10
SPP pupil pre behavioural conduct	2.6800	.66299	10
SPP parent post behavioural conduct	2.8000	1.07600	10
SPP pupil post behavioural conduct	2.8100	.69354	10

Multivariate Tests[a]

Effect			Value	F
Between Subjects	Intercept	Pillai's Trace	.998	525.437[b]
		Wilks' Lambda	.002	525.437[b]
		Hotelling's Trace	525.437	525.437[b]
		Roy's Largest Root	525.437	525.437[b]
Within Subjects	Time	Pillai's Trace	.710	2.451[b]
		Wilks' Lambda	.290	2.451[b]
		Hotelling's Trace	2.451	2.451[b]
		Roy's Largest Root	2.451	2.451[b]
	Respondent	Pillai's Trace	.874	6.923[b]
		Wilks' Lambda	.126	6.923[b]
		Hotelling's Trace	6.923	6.923[b]
		Roy's Largest Root	6.923	6.923[b]
	Time * Respondent	Pillai's Trace	.725	2.637[b]
		Wilks' Lambda	.275	2.637[b]
		Hotelling's Trace	2.637	2.637[b]
		Roy's Largest Root	2.637	2.637[b]

Multivariate Tests[a]

Effect			Hypothesis df	Error df	Sig.
Between Subjects	Intercept	Pillai's Trace	5.000	5.000	.000
		Wilks' Lambda	5.000	5.000	.000
		Hotelling's Trace	5.000	5.000	.000
		Roy's Largest Root	5.000	5.000	.000
Within Subjects	Time	Pillai's Trace	5.000	5.000	.174
		Wilks' Lambda	5.000	5.000	.174
		Hotelling's Trace	5.000	5.000	.174
		Roy's Largest Root	5.000	5.000	.174
	Respondent	Pillai's Trace	5.000	5.000	.027
		Wilks' Lambda	5.000	5.000	.027
		Hotelling's Trace	5.000	5.000	.027
		Roy's Largest Root	5.000	5.000	.027
	Time * Respondent	Pillai's Trace	5.000	5.000	.155
		Wilks' Lambda	5.000	5.000	.155
		Hotelling's Trace	5.000	5.000	.155
		Roy's Largest Root	5.000	5.000	.155

Multivariate Tests[a]

Effect			Partial Eta Squared
Between Subjects	Intercept	Pillai's Trace	.998
		Wilks' Lambda	.998
		Hotelling's Trace	.998
		Roy's Largest Root	.998
Within Subjects	Time	Pillai's Trace	.710
		Wilks' Lambda	.710
		Hotelling's Trace	.710
		Roy's Largest Root	.710
	Respondent	Pillai's Trace	.874
		Wilks' Lambda	.874
		Hotelling's Trace	.874
		Roy's Largest Root	.874
	Time * Respondent	Pillai's Trace	.725
		Wilks' Lambda	.725
		Hotelling's Trace	.725
		Roy's Largest Root	.725

a. Design: Intercept
Within Subjects Design: Time + Respondent + Time * Respondent

b. Exact statistic

Mauchly's Test of Sphericity[a]

Within Subjects Effect	Measure	Mauchly's W	Approx. Chi-Square	df	Sig.
Time	Scholasticcomp	1.000	.000	0	.
	Socialaccep	1.000	.000	0	.
	athletcomp	1.000	.000	0	.
	physicapp	1.000	.000	0	.
	behavconduct	1.000	.000	0	.
Respondent	Scholasticcomp	1.000	.000	0	.
	Socialaccep	1.000	.000	0	.
	athletcomp	1.000	.000	0	.
	physicapp	1.000	.000	0	.
	behavconduct	1.000	.000	0	.
Time * Respondent	Scholasticcomp	1.000	.000	0	.
	Socialaccep	1.000	.000	0	.
	athletcomp	1.000	.000	0	.
	physicapp	1.000	.000	0	.
	behavconduct	1.000	.000	0	.

Mauchly's Test of Sphericity[a]

		Epsilon[b]		
Within Subjects Effect	Measure	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	Scholasticcomp	1.000	1.000	1.000
	Socialaccep	1.000	1.000	1.000
	athletcomp	1.000	1.000	1.000
	physicapp	1.000	1.000	1.000
	behavconduct	1.000	1.000	1.000
Respondent	Scholasticcomp	1.000	1.000	1.000
	Socialaccep	1.000	1.000	1.000
	athletcomp	1.000	1.000	1.000
	physicapp	1.000	1.000	1.000
	behavconduct	1.000	1.000	1.000
Time * Respondent	Scholasticcomp	1.000	1.000	1.000
	Socialaccep	1.000	1.000	1.000
	athletcomp	1.000	1.000	1.000
	physicapp	1.000	1.000	1.000
	behavconduct	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: Time + Respondent + Time * Respondent

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Multivariate[a,b]

Within Subjects Effect		Value	F	Hypothesis df	Error df
Time	Pillai's Trace	.710	2.451[c]	5.000	5.000
	Wilks' Lambda	.290	2.451[c]	5.000	5.000
	Hotelling's Trace	2.451	2.451[c]	5.000	5.000
	Roy's Largest Root	2.451	2.451[c]	5.000	5.000
Respondent	Pillai's Trace	.874	6.923[c]	5.000	5.000
	Wilks' Lambda	.126	6.923[c]	5.000	5.000
	Hotelling's Trace	6.923	6.923[c]	5.000	5.000
	Roy's Largest Root	6.923	6.923[c]	5.000	5.000
Time * Respondent	Pillai's Trace	.725	2.637[c]	5.000	5.000
	Wilks' Lambda	.275	2.637[c]	5.000	5.000
	Hotelling's Trace	2.637	2.637[c]	5.000	5.000
	Roy's Largest Root	2.637	2.637[c]	5.000	5.000

Multivariate[a,b]

Within Subjects Effect		Sig.	Partial Eta Squared
Time	Pillai's Trace	.174	.710
	Wilks' Lambda	.174	.710
	Hotelling's Trace	.174	.710
	Roy's Largest Root	.174	.710
Respondent	Pillai's Trace	.027	.874
	Wilks' Lambda	.027	.874
	Hotelling's Trace	.027	.874
	Roy's Largest Root	.027	.874
Time * Respondent	Pillai's Trace	.155	.725
	Wilks' Lambda	.155	.725
	Hotelling's Trace	.155	.725
	Roy's Largest Root	.155	.725

a. Design: Intercept
Within Subjects Design: Time + Respondent + Time * Respondent

b. Tests are based on averaged variables.

c. Exact statistic

Univariate Tests

Source	Measure		Type III Sum of Squares	df
Time	Scholasticcomp	Sphericity Assumed	.361	1
		Greenhouse-Geisser	.361	1.000
		Huynh-Feldt	.361	1.000
		Lower-bound	.361	1.000
	Socialaccep	Sphericity Assumed	.182	1
		Greenhouse-Geisser	.182	1.000
		Huynh-Feldt	.182	1.000
		Lower-bound	.182	1.000
	athletcomp	Sphericity Assumed	.729	1
		Greenhouse-Geisser	.729	1.000
		Huynh-Feldt	.729	1.000
		Lower-bound	.729	1.000
	physicapp	Sphericity Assumed	.196	1
		Greenhouse-Geisser	.196	1.000
		Huynh-Feldt	.196	1.000
		Lower-bound	.196	1.000
	behavconduct	Sphericity Assumed	.002	1
		Greenhouse-Geisser	.002	1.000
		Huynh-Feldt	.002	1.000
		Lower-bound	.002	1.000
Error(Time)	Scholasticcomp	Sphericity Assumed	1.389	9
		Greenhouse-Geisser	1.389	9.000
		Huynh-Feldt	1.389	9.000
		Lower-bound	1.389	9.000
	Socialaccep	Sphericity Assumed	2.260	9
		Greenhouse-Geisser	2.260	9.000
		Huynh-Feldt	2.260	9.000
		Lower-bound	2.260	9.000
	athletcomp	Sphericity Assumed	1.406	9
		Greenhouse-Geisser	1.406	9.000
		Huynh-Feldt	1.406	9.000
		Lower-bound	1.406	9.000
	physicapp	Sphericity Assumed	.999	9
		Greenhouse-Geisser	.999	9.000
		Huynh-Feldt	.999	9.000
		Lower-bound	.999	9.000
	behavconduct	Sphericity Assumed	3.675	9
		Greenhouse-Geisser	3.675	9.000
		Huynh-Feldt	3.675	9.000
		Lower-bound	3.675	9.000
Respondent	Scholasticcomp	Sphericity Assumed	.484	1
		Greenhouse-Geisser	.484	1.000

Univariate Tests

Source	Measure		Mean Square	F
Time	Scholasticcomp	Sphericity Assumed	.361	2.339
		Greenhouse-Geisser	.361	2.339
		Huynh-Feldt	.361	2.339
		Lower-bound	.361	2.339
	Socialaccep	Sphericity Assumed	.182	.726
		Greenhouse-Geisser	.182	.726
		Huynh-Feldt	.182	.726
		Lower-bound	.182	.726
	athletcomp	Sphericity Assumed	.729	4.666
		Greenhouse-Geisser	.729	4.666
		Huynh-Feldt	.729	4.666
		Lower-bound	.729	4.666
	physicapp	Sphericity Assumed	.196	1.766
		Greenhouse-Geisser	.196	1.766
		Huynh-Feldt	.196	1.766
		Lower-bound	.196	1.766
	behavconduct	Sphericity Assumed	.002	.006
		Greenhouse-Geisser	.002	.006
		Huynh-Feldt	.002	.006
		Lower-bound	.002	.006
Error(Time)	Scholasticcomp	Sphericity Assumed	.154	
		Greenhouse-Geisser	.154	
		Huynh-Feldt	.154	
		Lower-bound	.154	
	Socialaccep	Sphericity Assumed	.251	
		Greenhouse-Geisser	.251	
		Huynh-Feldt	.251	
		Lower-bound	.251	
	athletcomp	Sphericity Assumed	.156	
		Greenhouse-Geisser	.156	
		Huynh-Feldt	.156	
		Lower-bound	.156	
	physicapp	Sphericity Assumed	.111	
		Greenhouse-Geisser	.111	
		Huynh-Feldt	.111	
		Lower-bound	.111	
	behavconduct	Sphericity Assumed	.408	
		Greenhouse-Geisser	.408	
		Huynh-Feldt	.408	
		Lower-bound	.408	
Respondent	Scholasticcomp	Sphericity Assumed	.484	.791
		Greenhouse-Geisser	.484	.791

Univariate Tests

Source	Measure		Sig.	Partial Eta Squared
Time	Scholasticcomp	Sphericity Assumed	.161	.206
		Greenhouse-Geisser	.161	.206
		Huynh-Feldt	.161	.206
		Lower-bound	.161	.206
	Socialaccep	Sphericity Assumed	.416	.075
		Greenhouse-Geisser	.416	.075
		Huynh-Feldt	.416	.075
		Lower-bound	.416	.075
	athletcomp	Sphericity Assumed	.059	.341
		Greenhouse-Geisser	.059	.341
		Huynh-Feldt	.059	.341
		Lower-bound	.059	.341
	physicapp	Sphericity Assumed	.217	.164
		Greenhouse-Geisser	.217	.164
		Huynh-Feldt	.217	.164
		Lower-bound	.217	.164
	behavconduct	Sphericity Assumed	.942	.001
		Greenhouse-Geisser	.942	.001
		Huynh-Feldt	.942	.001
		Lower-bound	.942	.001
Error(Time)	Scholasticcomp	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		
	Socialaccep	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		
	athletcomp	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		
	physicapp	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		
	behavconduct	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		
Respondent	Scholasticcomp	Sphericity Assumed	.397	.081
		Greenhouse-Geisser	.397	.081

Univariate Tests

Source	Measure		Type III Sum of Squares	df
		Huynh-Feldt	.484	1.000
		Lower-bound	.484	1.000
	Socialaccep	Sphericity Assumed	2.862	1
		Greenhouse-Geisser	2.862	1.000
		Huynh-Feldt	2.862	1.000
		Lower-bound	2.862	1.000
	athletcomp	Sphericity Assumed	5.625	1
		Greenhouse-Geisser	5.625	1.000
		Huynh-Feldt	5.625	1.000
		Lower-bound	5.625	1.000
	physicapp	Sphericity Assumed	7.056	1
		Greenhouse-Geisser	7.056	1.000
		Huynh-Feldt	7.056	1.000
		Lower-bound	7.056	1.000
	behavconduct	Sphericity Assumed	.110	1
		Greenhouse-Geisser	.110	1.000
		Huynh-Feldt	.110	1.000
		Lower-bound	.110	1.000
Error(Respondent)	Scholasticcomp	Sphericity Assumed	5.506	9
		Greenhouse-Geisser	5.506	9.000
		Huynh-Feldt	5.506	9.000
		Lower-bound	5.506	9.000
	Socialaccep	Sphericity Assumed	6.160	9
		Greenhouse-Geisser	6.160	9.000
		Huynh-Feldt	6.160	9.000
		Lower-bound	6.160	9.000
	athletcomp	Sphericity Assumed	7.780	9
		Greenhouse-Geisser	7.780	9.000
		Huynh-Feldt	7.780	9.000
		Lower-bound	7.780	9.000
	physicapp	Sphericity Assumed	2.609	9
		Greenhouse-Geisser	2.609	9.000
		Huynh-Feldt	2.609	9.000
		Lower-bound	2.609	9.000
	behavconduct	Sphericity Assumed	2.757	9
		Greenhouse-Geisser	2.757	9.000
		Huynh-Feldt	2.757	9.000
		Lower-bound	2.757	9.000
Time * Respondent	Scholasticcomp	Sphericity Assumed	.064	1
		Greenhouse-Geisser	.064	1.000
		Huynh-Feldt	.064	1.000
		Lower-bound	.064	1.000

Univariate Tests

Source	Measure		Mean Square	F
		Huynh-Feldt	.484	.791
		Lower-bound	.484	.791
	Socialaccep	Sphericity Assumed	2.862	4.182
		Greenhouse-Geisser	2.862	4.182
		Huynh-Feldt	2.862	4.182
		Lower-bound	2.862	4.182
	athletcomp	Sphericity Assumed	5.625	6.507
		Greenhouse-Geisser	5.625	6.507
		Huynh-Feldt	5.625	6.507
		Lower-bound	5.625	6.507
	physicapp	Sphericity Assumed	7.056	24.340
		Greenhouse-Geisser	7.056	24.340
		Huynh-Feldt	7.056	24.340
		Lower-bound	7.056	24.340
	behavconduct	Sphericity Assumed	.110	.360
		Greenhouse-Geisser	.110	.360
		Huynh-Feldt	.110	.360
		Lower-bound	.110	.360
Error(Respondent)	Scholasticcomp	Sphericity Assumed	.612	
		Greenhouse-Geisser	.612	
		Huynh-Feldt	.612	
		Lower-bound	.612	
	Socialaccep	Sphericity Assumed	.684	
		Greenhouse-Geisser	.684	
		Huynh-Feldt	.684	
		Lower-bound	.684	
	athletcomp	Sphericity Assumed	.864	
		Greenhouse-Geisser	.864	
		Huynh-Feldt	.864	
		Lower-bound	.864	
	physicapp	Sphericity Assumed	.290	
		Greenhouse-Geisser	.290	
		Huynh-Feldt	.290	
		Lower-bound	.290	
	behavconduct	Sphericity Assumed	.306	
		Greenhouse-Geisser	.306	
		Huynh-Feldt	.306	
		Lower-bound	.306	
Time * Respondent	Scholasticcomp	Sphericity Assumed	.064	.304
		Greenhouse-Geisser	.064	.304
		Huynh-Feldt	.064	.304
		Lower-bound	.064	.304

Univariate Tests

Source	Measure		Sig.	Partial Eta Squared
		Huynh-Feldt	.397	.081
		Lower-bound	.397	.081
	Socialaccep	Sphericity Assumed	.071	.317
		Greenhouse-Geisser	.071	.317
		Huynh-Feldt	.071	.317
		Lower-bound	.071	.317
	athletcomp	Sphericity Assumed	.031	.420
		Greenhouse-Geisser	.031	.420
		Huynh-Feldt	.031	.420
		Lower-bound	.031	.420
	physicapp	Sphericity Assumed	.001	.730
		Greenhouse-Geisser	.001	.730
		Huynh-Feldt	.001	.730
		Lower-bound	.001	.730
	behavconduct	Sphericity Assumed	.563	.038
		Greenhouse-Geisser	.563	.038
		Huynh-Feldt	.563	.038
		Lower-bound	.563	.038
Error(Respondent)	Scholasticcomp	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		
	Socialaccep	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		
	athletcomp	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		
	physicapp	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		
	behavconduct	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		
Time * Respondent	Scholasticcomp	Sphericity Assumed	.595	.033
		Greenhouse-Geisser	.595	.033
		Huynh-Feldt	.595	.033
		Lower-bound	.595	.033

Univariate Tests

Source	Measure		Type III Sum of Squares	df
	Socialaccep	Sphericity Assumed	.090	1
		Greenhouse-Geisser	.090	1.000
		Huynh-Feldt	.090	1.000
		Lower-bound	.090	1.000
	athletcomp	Sphericity Assumed	.529	1
		Greenhouse-Geisser	.529	1.000
		Huynh-Feldt	.529	1.000
		Lower-bound	.529	1.000
	physicapp	Sphericity Assumed	.256	1
		Greenhouse-Geisser	.256	1.000
		Huynh-Feldt	.256	1.000
		Lower-bound	.256	1.000
	behavconduct	Sphericity Assumed	.132	1
		Greenhouse-Geisser	.132	1.000
		Huynh-Feldt	.132	1.000
		Lower-bound	.132	1.000
Error(Time*Respondent)	Scholasticcomp	Sphericity Assumed	1.896	9
		Greenhouse-Geisser	1.896	9.000
		Huynh-Feldt	1.896	9.000
		Lower-bound	1.896	9.000
	Socialaccep	Sphericity Assumed	1.872	9
		Greenhouse-Geisser	1.872	9.000
		Huynh-Feldt	1.872	9.000
		Lower-bound	1.872	9.000
	athletcomp	Sphericity Assumed	1.096	9
		Greenhouse-Geisser	1.096	9.000
		Huynh-Feldt	1.096	9.000
		Lower-bound	1.096	9.000
	physicapp	Sphericity Assumed	2.539	9
		Greenhouse-Geisser	2.539	9.000
		Huynh-Feldt	2.539	9.000
		Lower-bound	2.539	9.000
	behavconduct	Sphericity Assumed	5.725	9
		Greenhouse-Geisser	5.725	9.000
		Huynh-Feldt	5.725	9.000
		Lower-bound	5.725	9.000

Univariate Tests

Source	Measure		Mean Square	F
	Socialaccep	Sphericity Assumed	.090	.434
		Greenhouse-Geisser	.090	.434
		Huynh-Feldt	.090	.434
		Lower-bound	.090	.434
	athletcomp	Sphericity Assumed	.529	4.344
		Greenhouse-Geisser	.529	4.344
		Huynh-Feldt	.529	4.344
		Lower-bound	.529	4.344
	physicapp	Sphericity Assumed	.256	.907
		Greenhouse-Geisser	.256	.907
		Huynh-Feldt	.256	.907
		Lower-bound	.256	.907
	behavconduct	Sphericity Assumed	.132	.208
		Greenhouse-Geisser	.132	.208
		Huynh-Feldt	.132	.208
		Lower-bound	.132	.208
Error(Time*Respondent)	Scholasticcomp	Sphericity Assumed	.211	
		Greenhouse-Geisser	.211	
		Huynh-Feldt	.211	
		Lower-bound	.211	
	Socialaccep	Sphericity Assumed	.208	
		Greenhouse-Geisser	.208	
		Huynh-Feldt	.208	
		Lower-bound	.208	
	athletcomp	Sphericity Assumed	.122	
		Greenhouse-Geisser	.122	
		Huynh-Feldt	.122	
		Lower-bound	.122	
	physicapp	Sphericity Assumed	.282	
		Greenhouse-Geisser	.282	
		Huynh-Feldt	.282	
		Lower-bound	.282	
	behavconduct	Sphericity Assumed	.636	
		Greenhouse-Geisser	.636	
		Huynh-Feldt	.636	
		Lower-bound	.636	

Univariate Tests

Source	Measure		Sig.	Partial Eta Squared
	Socialaccep	Sphericity Assumed	.527	.046
		Greenhouse-Geisser	.527	.046
		Huynh-Feldt	.527	.046
		Lower-bound	.527	.046
	athletcomp	Sphericity Assumed	.067	.326
		Greenhouse-Geisser	.067	.326
		Huynh-Feldt	.067	.326
		Lower-bound	.067	.326
	physicapp	Sphericity Assumed	.366	.092
		Greenhouse-Geisser	.366	.092
		Huynh-Feldt	.366	.092
		Lower-bound	.366	.092
	behavconduct	Sphericity Assumed	.659	.023
		Greenhouse-Geisser	.659	.023
		Huynh-Feldt	.659	.023
		Lower-bound	.659	.023
Error(Time*Respondent)	Scholasticcomp	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		
	Socialaccep	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		
	athletcomp	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		
	physicapp	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		
	behavconduct	Sphericity Assumed		
		Greenhouse-Geisser		
		Huynh-Feldt		
		Lower-bound		

Tests of Within-Subjects Contrasts

Source	Measure	Time	Respondent	Type III Sum of Squares
Time	Scholasticcomp	Level 1 vs. Level 2		.361
	Socialaccep	Level 1 vs. Level 2		.182
	athletcomp	Level 1 vs. Level 2		.729
	physicapp	Level 1 vs. Level 2		.196
	behavconduct	Level 1 vs. Level 2		.002
Error(Time)	Scholasticcomp	Level 1 vs. Level 2		1.389
	Socialaccep	Level 1 vs. Level 2		2.260
	athletcomp	Level 1 vs. Level 2		1.406
	physicapp	Level 1 vs. Level 2		.999
	behavconduct	Level 1 vs. Level 2		3.675
Respondent	Scholasticcomp		Level 1 vs. Level 2	.484
	Socialaccep		Level 1 vs. Level 2	2.862
	athletcomp		Level 1 vs. Level 2	5.625
	physicapp		Level 1 vs. Level 2	7.056
	behavconduct		Level 1 vs. Level 2	.110
Error(Respondent)	Scholasticcomp		Level 1 vs. Level 2	5.506
	Socialaccep		Level 1 vs. Level 2	6.160
	athletcomp		Level 1 vs. Level 2	7.780
	physicapp		Level 1 vs. Level 2	2.609
	behavconduct		Level 1 vs. Level 2	2.757
Time * Respondent	Scholasticcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	.256
	Socialaccep	Level 1 vs. Level 2	Level 1 vs. Level 2	.361
	athletcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	2.116
	physicapp	Level 1 vs. Level 2	Level 1 vs. Level 2	1.024
	behavconduct	Level 1 vs. Level 2	Level 1 vs. Level 2	.529
Error(Time*Respondent)	Scholasticcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	7.584
	Socialaccep	Level 1 vs. Level 2	Level 1 vs. Level 2	7.489
	athletcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	4.384
	physicapp	Level 1 vs. Level 2	Level 1 vs. Level 2	10.156
	behavconduct	Level 1 vs. Level 2	Level 1 vs. Level 2	22.901

Tests of Within-Subjects Contrasts

Source	Measure	Time	Respondent	df
Time	Scholasticcomp	Level 1 vs. Level 2		1
	Socialaccep	Level 1 vs. Level 2		1
	athletcomp	Level 1 vs. Level 2		1
	physicapp	Level 1 vs. Level 2		1
	behavconduct	Level 1 vs. Level 2		1
Error(Time)	Scholasticcomp	Level 1 vs. Level 2		9
	Socialaccep	Level 1 vs. Level 2		9
	athletcomp	Level 1 vs. Level 2		9
	physicapp	Level 1 vs. Level 2		9
	behavconduct	Level 1 vs. Level 2		9
Respondent	Scholasticcomp		Level 1 vs. Level 2	1
	Socialaccep		Level 1 vs. Level 2	1
	athletcomp		Level 1 vs. Level 2	1
	physicapp		Level 1 vs. Level 2	1
	behavconduct		Level 1 vs. Level 2	1
Error(Respondent)	Scholasticcomp		Level 1 vs. Level 2	9
	Socialaccep		Level 1 vs. Level 2	9
	athletcomp		Level 1 vs. Level 2	9
	physicapp		Level 1 vs. Level 2	9
	behavconduct		Level 1 vs. Level 2	9
Time * Respondent	Scholasticcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	1
	Socialaccep	Level 1 vs. Level 2	Level 1 vs. Level 2	1
	athletcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	1
	physicapp	Level 1 vs. Level 2	Level 1 vs. Level 2	1
	behavconduct	Level 1 vs. Level 2	Level 1 vs. Level 2	1
Error(Time*Respondent)	Scholasticcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	9
	Socialaccep	Level 1 vs. Level 2	Level 1 vs. Level 2	9
	athletcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	9
	physicapp	Level 1 vs. Level 2	Level 1 vs. Level 2	9
	behavconduct	Level 1 vs. Level 2	Level 1 vs. Level 2	9

Tests of Within-Subjects Contrasts

Source	Measure	Time	Respondent	Mean Square
Time	Scholasticcomp	Level 1 vs. Level 2		.361
	Socialaccep	Level 1 vs. Level 2		.182
	athletcomp	Level 1 vs. Level 2		.729
	physicapp	Level 1 vs. Level 2		.196
	behavconduct	Level 1 vs. Level 2		.002
Error(Time)	Scholasticcomp	Level 1 vs. Level 2		.154
	Socialaccep	Level 1 vs. Level 2		.251
	athletcomp	Level 1 vs. Level 2		.156
	physicapp	Level 1 vs. Level 2		.111
	behavconduct	Level 1 vs. Level 2		.408
Respondent	Scholasticcomp		Level 1 vs. Level 2	.484
	Socialaccep		Level 1 vs. Level 2	2.862
	athletcomp		Level 1 vs. Level 2	5.625
	physicapp		Level 1 vs. Level 2	7.056
	behavconduct		Level 1 vs. Level 2	.110
Error(Respondent)	Scholasticcomp		Level 1 vs. Level 2	.612
	Socialaccep		Level 1 vs. Level 2	.684
	athletcomp		Level 1 vs. Level 2	.864
	physicapp		Level 1 vs. Level 2	.290
	behavconduct		Level 1 vs. Level 2	.306
Time * Respondent	Scholasticcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	.256
	Socialaccep	Level 1 vs. Level 2	Level 1 vs. Level 2	.361
	athletcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	2.116
	physicapp	Level 1 vs. Level 2	Level 1 vs. Level 2	1.024
	behavconduct	Level 1 vs. Level 2	Level 1 vs. Level 2	.529
Error(Time*Respondent)	Scholasticcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	.843
	Socialaccep	Level 1 vs. Level 2	Level 1 vs. Level 2	.832
	athletcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	.487
	physicapp	Level 1 vs. Level 2	Level 1 vs. Level 2	1.128
	behavconduct	Level 1 vs. Level 2	Level 1 vs. Level 2	2.545

Tests of Within-Subjects Contrasts

Source	Measure	Time	Respondent	F
Time	Scholasticcomp	Level 1 vs. Level 2		2.339
	Socialaccep	Level 1 vs. Level 2		.726
	athletcomp	Level 1 vs. Level 2		4.666
	physicapp	Level 1 vs. Level 2		1.766
	behavconduct	Level 1 vs. Level 2		.006
Error(Time)	Scholasticcomp	Level 1 vs. Level 2		
	Socialaccep	Level 1 vs. Level 2		
	athletcomp	Level 1 vs. Level 2		
	physicapp	Level 1 vs. Level 2		
	behavconduct	Level 1 vs. Level 2		
Respondent	Scholasticcomp		Level 1 vs. Level 2	.791
	Socialaccep		Level 1 vs. Level 2	4.182
	athletcomp		Level 1 vs. Level 2	6.507
	physicapp		Level 1 vs. Level 2	24.340
	behavconduct		Level 1 vs. Level 2	.360
Error(Respondent)	Scholasticcomp		Level 1 vs. Level 2	
	Socialaccep		Level 1 vs. Level 2	
	athletcomp		Level 1 vs. Level 2	
	physicapp		Level 1 vs. Level 2	
	behavconduct		Level 1 vs. Level 2	
Time * Respondent	Scholasticcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	.304
	Socialaccep	Level 1 vs. Level 2	Level 1 vs. Level 2	.434
	athletcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	4.344
	physicapp	Level 1 vs. Level 2	Level 1 vs. Level 2	.907
	behavconduct	Level 1 vs. Level 2	Level 1 vs. Level 2	.208
Error(Time*Respondent)	Scholasticcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	
	Socialaccep	Level 1 vs. Level 2	Level 1 vs. Level 2	
	athletcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	
	physicapp	Level 1 vs. Level 2	Level 1 vs. Level 2	
	behavconduct	Level 1 vs. Level 2	Level 1 vs. Level 2	

Tests of Within-Subjects Contrasts

Source	Measure	Time	Respondent	Sig.
Time	Scholasticcomp	Level 1 vs. Level 2		.161
	Socialaccep	Level 1 vs. Level 2		.416
	athletcomp	Level 1 vs. Level 2		.059
	physicapp	Level 1 vs. Level 2		.217
	behavconduct	Level 1 vs. Level 2		.942
Error(Time)	Scholasticcomp	Level 1 vs. Level 2		
	Socialaccep	Level 1 vs. Level 2		
	athletcomp	Level 1 vs. Level 2		
	physicapp	Level 1 vs. Level 2		
	behavconduct	Level 1 vs. Level 2		
Respondent	Scholasticcomp		Level 1 vs. Level 2	.397
	Socialaccep		Level 1 vs. Level 2	.071
	athletcomp		Level 1 vs. Level 2	.031
	physicapp		Level 1 vs. Level 2	.001
	behavconduct		Level 1 vs. Level 2	.563
Error(Respondent)	Scholasticcomp		Level 1 vs. Level 2	
	Socialaccep		Level 1 vs. Level 2	
	athletcomp		Level 1 vs. Level 2	
	physicapp		Level 1 vs. Level 2	
	behavconduct		Level 1 vs. Level 2	
Time * Respondent	Scholasticcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	.595
	Socialaccep	Level 1 vs. Level 2	Level 1 vs. Level 2	.527
	athletcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	.067
	physicapp	Level 1 vs. Level 2	Level 1 vs. Level 2	.366
	behavconduct	Level 1 vs. Level 2	Level 1 vs. Level 2	.659
Error(Time*Respondent)	Scholasticcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	
	Socialaccep	Level 1 vs. Level 2	Level 1 vs. Level 2	
	athletcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	
	physicapp	Level 1 vs. Level 2	Level 1 vs. Level 2	
	behavconduct	Level 1 vs. Level 2	Level 1 vs. Level 2	

Tests of Within-Subjects Contrasts

Source	Measure	Time	Respondent	Partial Eta Squared
Time	Scholasticcomp	Level 1 vs. Level 2		.206
	Socialaccep	Level 1 vs. Level 2		.075
	athletcomp	Level 1 vs. Level 2		.341
	physicapp	Level 1 vs. Level 2		.164
	behavconduct	Level 1 vs. Level 2		.001
Error(Time)	Scholasticcomp	Level 1 vs. Level 2		
	Socialaccep	Level 1 vs. Level 2		
	athletcomp	Level 1 vs. Level 2		
	physicapp	Level 1 vs. Level 2		
	behavconduct	Level 1 vs. Level 2		
Respondent	Scholasticcomp		Level 1 vs. Level 2	.081
	Socialaccep		Level 1 vs. Level 2	.317
	athletcomp		Level 1 vs. Level 2	.420
	physicapp		Level 1 vs. Level 2	.730
	behavconduct		Level 1 vs. Level 2	.038
Error(Respondent)	Scholasticcomp		Level 1 vs. Level 2	
	Socialaccep		Level 1 vs. Level 2	
	athletcomp		Level 1 vs. Level 2	
	physicapp		Level 1 vs. Level 2	
	behavconduct		Level 1 vs. Level 2	
Time * Respondent	Scholasticcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	.033
	Socialaccep	Level 1 vs. Level 2	Level 1 vs. Level 2	.046
	athletcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	.326
	physicapp	Level 1 vs. Level 2	Level 1 vs. Level 2	.092
	behavconduct	Level 1 vs. Level 2	Level 1 vs. Level 2	.023
Error(Time*Respondent)	Scholasticcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	
	Socialaccep	Level 1 vs. Level 2	Level 1 vs. Level 2	
	athletcomp	Level 1 vs. Level 2	Level 1 vs. Level 2	
	physicapp	Level 1 vs. Level 2	Level 1 vs. Level 2	
	behavconduct	Level 1 vs. Level 2	Level 1 vs. Level 2	

Tests of Between-Subjects Effects

Transformed Variable: Average

Source	Measure	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	Scholasticcomp	66.306	1	66.306	128.094	.000
	Socialaccep	60.639	1	60.639	411.403	.000
	athletcomp	41.412	1	41.412	191.477	.000
	physicapp	119.025	1	119.025	2885.455	.000
	behavconduct	78.260	1	78.260	296.338	.000
Error	Scholasticcomp	4.659	9	.518		
	Socialaccep	1.327	9	.147		
	athletcomp	1.947	9	.216		
	physicapp	.371	9	.041		
	behavconduct	2.377	9	.264		

Tests of Between-Subjects Effects

Transformed Variable: Average

Source	Measure	Partial Eta Squared
Intercept	Scholasticcomp	.934
	Socialaccep	.979
	athletcomp	.955
	physicapp	.997
	behavconduct	.971
Error	Scholasticcomp	
	Socialaccep	
	athletcomp	
	physicapp	
	behavconduct	

Parameter Estimates

Dependent Variable	Parameter	B	Std. Error	t	Sig.
SPP parent pre scholastic competence	Intercept	2.630	.348	7.550	.000
SPP pupil pre scholastic competence	Intercept	2.330	.204	11.428	.000
SPP parent post scholastic competence	Intercept	2.740	.306	8.945	.000
SPP pupil post scholastic competence	Intercept	2.600	.219	11.867	.000
SPP parent pre social competence	Intercept	2.080	.206	10.075	.000
SPP pupil pre social competence	Intercept	2.710	.168	16.103	.000
SPP parent post social acceptance	Intercept	2.310	.189	12.233	.000
SPP pupil post social competence	Intercept	2.750	.258	10.646	.000
SPP parent pre athletic competence	Intercept	1.640	.205	8.019	.000
SPP pupil pre athletic competence	Intercept	2.160	.237	9.124	.000
SPP parent post athletic competence	Intercept	1.680	.247	6.798	.000
SPP pupil post athletic competence	Intercept	2.660	.205	13.007	.000
SPP parent pre physical appreance	Intercept	3.880	.061	63.501	.000
SPP pupil pre physical apprearance	Intercept	2.880	.144	20.055	.000
SPP parent post physical apprearance	Intercept	3.860	.103	37.297	.000
SPP pupil post physical appearance	Intercept	3.180	.223	14.259	.000
SPP parent pre behavioural conduct	Intercept	2.900	.181	15.991	.000
SPP pupil pre behavioural conduct	Intercept	2.680	.210	12.783	.000
SPP parent post behavioural conduct	Intercept	2.800	.340	8.229	.000
SPP pupil post behavioural conduct	Intercept	2.810	.219	12.812	.000

Parameter Estimates

Dependent Variable	Parameter	95% Confidence Interval		Partial Eta Squared
		Lower Bound	Upper Bound	
SPP parent pre scholastic competence	Intercept	1.842	3.418	.864
SPP pupil pre scholastic competence	Intercept	1.869	2.791	.936
SPP parent post scholastic competence	Intercept	2.047	3.433	.899
SPP pupil post scholastic competence	Intercept	2.104	3.096	.940
SPP parent pre social competence	Intercept	1.613	2.547	.919
SPP pupil pre social competence	Intercept	2.329	3.091	.966
SPP parent post social acceptance	Intercept	1.883	2.737	.943
SPP pupil post social competence	Intercept	2.166	3.334	.926
SPP parent pre athletic competence	Intercept	1.177	2.103	.877
SPP pupil pre athletic competence	Intercept	1.624	2.696	.902
SPP parent post athletic competence	Intercept	1.121	2.239	.837
SPP pupil post athletic competence	Intercept	2.197	3.123	.949
SPP parent pre physical appreance	Intercept	3.742	4.018	.998
SPP pupil pre physical apprearance	Intercept	2.555	3.205	.978
SPP parent post physical apprearance	Intercept	3.626	4.094	.994
SPP pupil post physical appearance	Intercept	2.676	3.684	.958
SPP parent pre behavioural conduct	Intercept	2.490	3.310	.966
SPP pupil pre behavioural conduct	Intercept	2.206	3.154	.948
SPP parent post behavioural conduct	Intercept	2.030	3.570	.883
SPP pupil post behavioural conduct	Intercept	2.314	3.306	.948

Estimated Marginal Means

1. Time

Estimates

Measure	Time	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Scholasticcomp	1	2.480	.246	1.923	3.037
	2	2.670	.225	2.161	3.179
Socialaccep	1	2.395	.132	2.096	2.694
	2	2.530	.157	2.175	2.885
athletcomp	1	1.900	.154	1.552	2.248
	2	2.170	.166	1.796	2.544
physicapp	1	3.380	.063	3.238	3.522
	2	3.520	.099	3.296	3.744
behavconduct	1	2.790	.169	2.407	3.173
	2	2.805	.211	2.327	3.283

Pairwise Comparisons

Measure	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence [a]...
						Lower Bound
Scholasticcomp	1	2	-.190	.124	.161	-.471
	2	1	.190	.124	.161	-.091
Socialaccep	1	2	-.135	.158	.416	-.493
	2	1	.135	.158	.416	-.223
athletcomp	1	2	-.270	.125	.059	-.553
	2	1	.270	.125	.059	-.013
physicapp	1	2	-.140	.105	.217	-.378
	2	1	.140	.105	.217	-.098
behavconduct	1	2	-.015	.202	.942	-.472
	2	1	.015	.202	.942	-.442

Pairwise Comparisons

Measure	(I) Time	(J) Time	95% Confidence [a]...
			Upper Bound
Scholasticcomp	1	2	.091
	2	1	.471
Socialaccep	1	2	.223
	2	1	.493
athletcomp	1	2	.013
	2	1	.553
physicapp	1	2	.098
	2	1	.378
behavconduct	1	2	.442
	2	1	.472

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.710	2.451[a]	5.000	5.000	.174	.710
Wilks' lambda	.290	2.451[a]	5.000	5.000	.174	.710
Hotelling's trace	2.451	2.451[a]	5.000	5.000	.174	.710
Roy's largest root	2.451	2.451[a]	5.000	5.000	.174	.710

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

2. Grand Mean

Measure	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Scholasticcomp	2.575	.228	2.060	3.090
Socialaccep	2.463	.121	2.188	2.737
athletcomp	2.035	.147	1.702	2.368
physicapp	3.450	.064	3.305	3.595
behavconduct	2.798	.163	2.430	3.165

3. Respondent

Estimates

Measure	Respondent	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Scholasticcomp	1	2.685	.301	2.004	3.366
	2	2.465	.208	1.994	2.936
Socialaccep	1	2.195	.156	1.843	2.547
	2	2.730	.199	2.280	3.180
athletcomp	1	1.660	.218	1.167	2.153
	2	2.410	.197	1.964	2.856
physicapp	1	3.870	.060	3.735	4.005
	2	3.030	.138	2.717	3.343
behavconduct	1	2.850	.190	2.420	3.280
	2	2.745	.179	2.340	3.150

Pairwise Comparisons

Measure	(I) Respondent	(J) Respondent	Mean Difference (I-J)	Std. Error	Sig.[b]
Scholasticcomp	1	2	.220	.247	.397
	2	1	-.220	.247	.397
Socialaccep	1	2	-.535	.262	.071
	2	1	.535	.262	.071
athletcomp	1	2	-.750*	.294	.031
	2	1	.750*	.294	.031
physicapp	1	2	.840*	.170	.001
	2	1	-.840*	.170	.001
behavconduct	1	2	.105	.175	.563
	2	1	-.105	.175	.563

Pairwise Comparisons

Measure	(I) Respondent	(J) Respondent	95% Confidence Interval for Difference[b]	
			Lower Bound	Upper Bound
Scholasticcomp	1	2	-.340	.780
	2	1	-.780	.340
Socialaccep	1	2	-1.127	.057
	2	1	-.057	1.127
athletcomp	1	2	-1.415	-.085
	2	1	.085	1.415
physicapp	1	2	.455	1.225
	2	1	-1.225	-.455
behavconduct	1	2	-.291	.501
	2	1	-.501	.291

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.874	6.923[a]	5.000	5.000	.027	.874
Wilks' lambda	.126	6.923[a]	5.000	5.000	.027	.874
Hotelling's trace	6.923	6.923[a]	5.000	5.000	.027	.874
Roy's largest root	6.923	6.923[a]	5.000	5.000	.027	.874

Each F tests the multivariate effect of Respondent. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

4. Time * Respondent

Measure	Time	Respondent	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Scholasticcomp	1	1	2.630	.348	1.842	3.418
		2	2.330	.204	1.869	2.791
	2	1	2.740	.306	2.047	3.433
		2	2.600	.219	2.104	3.096
Socialaccep	1	1	2.080	.206	1.613	2.547
		2	2.710	.168	2.329	3.091
	2	1	2.310	.189	1.883	2.737
		2	2.750	.258	2.166	3.334
athletcomp	1	1	1.640	.205	1.177	2.103
		2	2.160	.237	1.624	2.696
	2	1	1.680	.247	1.121	2.239
		2	2.660	.205	2.197	3.123
physicapp	1	1	3.880	.061	3.742	4.018
		2	2.880	.144	2.555	3.205
	2	1	3.860	.103	3.626	4.094
		2	3.180	.223	2.676	3.684
behavconduct	1	1	2.900	.181	2.490	3.310
		2	2.680	.210	2.206	3.154
	2	1	2.800	.340	2.030	3.570
		2	2.810	.219	2.314	3.306

SPP T-Test

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T-Test

Notes

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Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	SPP pupil pre global self worth	2.7500	10	.69001	.21820
	SPP pupil post global self worth	3.0800	10	.65115	.20591

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	SPP pupil pre global self worth & SPP pupil post global self worth	10	.544	.104

Page 1

Paired Samples Test

		Paired Differences			
					95% Confidence ...
		Mean	Std. Deviation	Std. Error Mean	Lower
Pair 1	SPP pupil pre global self worth - SPP pupil post global self worth	-.33000	.64127	.20279	-.78873

Paired Samples Test

		Paired ...			
		95% Confidence ...			
		Upper	t	df	Sig. (2-tailed)
Pair 1	SPP pupil pre global self worth - SPP pupil post global self worth	.12873	-1.627	9	.138

SSQ Mixed ANOVA

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  /EMMEANS=TABLES(OVERALL)
  /EMMEANS=TABLES(Respondent) COMPARE ADJ(BONFERRONI)
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General Linear Model

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	Cases Used	Statistics are based on all cases with valid data for all variables in the model.
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Warnings

The HOMOGENEITY specification in the PRINT subcommand will be ignored because there are no between-subjects factors.

Within-Subjects Factors

Measure: SSQtotal

Respondent	Time	Dependent Variable
1	1	SSQpuPRE
	2	SSQpuPOST
2	1	SSQteaPRE
	2	SSQteaPOST
3	1	SSQparPRE
	2	SSQparPOST

Descriptive Statistics

	Mean	Std. Deviation	N
SSQ pupil pre	46.3000	4.76212	10
SSQ pupil post	43.0000	7.00793	10
SSQ teacher pre	38.2000	12.15456	10
SSQ teacher post	34.6000	12.33063	10
SSQ parent pre	42.9000	8.30596	10
SSQ parent post	41.9000	11.34754	10

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df
Respondent	Pillai's Trace	.372	2.370[b]	2.000	8.000
	Wilks' Lambda	.628	2.370[b]	2.000	8.000
	Hotelling's Trace	.593	2.370[b]	2.000	8.000
	Roy's Largest Root	.593	2.370[b]	2.000	8.000
Time	Pillai's Trace	.239	2.821[b]	1.000	9.000
	Wilks' Lambda	.761	2.821[b]	1.000	9.000
	Hotelling's Trace	.313	2.821[b]	1.000	9.000
	Roy's Largest Root	.313	2.821[b]	1.000	9.000
Respondent * Time	Pillai's Trace	.076	.330[b]	2.000	8.000
	Wilks' Lambda	.924	.330[b]	2.000	8.000
	Hotelling's Trace	.082	.330[b]	2.000	8.000
	Roy's Largest Root	.082	.330[b]	2.000	8.000

Page 2

Multivariate Tests[a]

Effect		Sig.	Partial Eta Squared
Respondent	Pillai's Trace	.155	.372
	Wilks' Lambda	.155	.372
	Hotelling's Trace	.155	.372
	Roy's Largest Root	.155	.372
Time	Pillai's Trace	.127	.239
	Wilks' Lambda	.127	.239
	Hotelling's Trace	.127	.239
	Roy's Largest Root	.127	.239
Respondent * Time	Pillai's Trace	.728	.076
	Wilks' Lambda	.728	.076
	Hotelling's Trace	.728	.076
	Roy's Largest Root	.728	.076

a. Design: Intercept
Within Subjects Design: Respondent + Time + Respondent * Time

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: SSQtotal

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
Respondent	.830	1.490	2	.475	.855
Time	1.000	.000	0	.	1.000
Respondent * Time	.938	.512	2	.774	.942

Mauchly's Test of Sphericity[a]

Measure: SSQtotal

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Epsilon[b] Lower-bound
Respondent	1.000	.500
Time	1.000	1.000
Respondent * Time	1.000	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: Respondent + Time + Respondent * Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: SSQtotal

Source		Type III Sum of Squares	df	Mean Square
Respondent	Sphericity Assumed	727.500	2	363.750
	Greenhouse-Geisser	727.500	1.709	425.574
	Huynh-Feldt	727.500	2.000	363.750
	Lower-bound	727.500	1.000	727.500
Error(Respondent)	Sphericity Assumed	2131.833	18	118.435
	Greenhouse-Geisser	2131.833	15.385	138.565
	Huynh-Feldt	2131.833	18.000	118.435
	Lower-bound	2131.833	9.000	236.870
Time	Sphericity Assumed	104.017	1	104.017
	Greenhouse-Geisser	104.017	1.000	104.017
	Huynh-Feldt	104.017	1.000	104.017
	Lower-bound	104.017	1.000	104.017
Error(Time)	Sphericity Assumed	331.817	9	36.869
	Greenhouse-Geisser	331.817	9.000	36.869
	Huynh-Feldt	331.817	9.000	36.869
	Lower-bound	331.817	9.000	36.869
Respondent * Time	Sphericity Assumed	20.233	2	10.117
	Greenhouse-Geisser	20.233	1.883	10.744
	Huynh-Feldt	20.233	2.000	10.117
	Lower-bound	20.233	1.000	20.233
Error(Respondent*Time)	Sphericity Assumed	590.433	18	32.802
	Greenhouse-Geisser	590.433	16.950	34.835
	Huynh-Feldt	590.433	18.000	32.802
	Lower-bound	590.433	9.000	65.604

Tests of Within-Subjects Effects

Measure: SSQtotal

Source		F	Sig.	Partial Eta Squared
Respondent	Sphericity Assumed	3.071	.071	.254
	Greenhouse-Geisser	3.071	.082	.254
	Huynh-Feldt	3.071	.071	.254
	Lower-bound	3.071	.114	.254
Error(Respondent)	Sphericity Assumed			
	Greenhouse-Geisser			
	Huynh-Feldt			
	Lower-bound			
Time	Sphericity Assumed	2.821	.127	.239
	Greenhouse-Geisser	2.821	.127	.239
	Huynh-Feldt	2.821	.127	.239
	Lower-bound	2.821	.127	.239
Error(Time)	Sphericity Assumed			
	Greenhouse-Geisser			
	Huynh-Feldt			
	Lower-bound			
Respondent * Time	Sphericity Assumed	.308	.738	.033
	Greenhouse-Geisser	.308	.726	.033
	Huynh-Feldt	.308	.738	.033
	Lower-bound	.308	.592	.033
Error(Respondent*Time)	Sphericity Assumed			
	Greenhouse-Geisser			
	Huynh-Feldt			
	Lower-bound			

Tests of Within-Subjects Contrasts

Measure: SSQtotal

Source	Respondent	Time	Type III Sum of Squares	df
Respondent	Level 1 vs. Level 2		680.625	1
	Level 2 vs. Level 3		360.000	1
Error(Respondent)	Level 1 vs. Level 2		1166.625	9
	Level 2 vs. Level 3		1386.000	9
Time		Level 1 vs. Level 2	69.344	1
Error(Time)		Level 1 vs. Level 2	221.211	9
Respondent * Time	Level 1 vs. Level 2	Level 1 vs. Level 2	.900	1
	Level 2 vs. Level 3	Level 1 vs. Level 2	67.600	1
Error(Respondent*Time)	Level 1 vs. Level 2	Level 1 vs. Level 2	1276.100	9
	Level 2 vs. Level 3	Level 1 vs. Level 2	892.400	9

Tests of Within-Subjects Contrasts

Measure: SSQtotal

Source	Respondent	Time	Mean Square	F
Respondent	Level 1 vs. Level 2		680.625	5.251
	Level 2 vs. Level 3		360.000	2.338
Error(Respondent)	Level 1 vs. Level 2		129.625	
	Level 2 vs. Level 3		154.000	
Time		Level 1 vs. Level 2	69.344	2.821
Error(Time)		Level 1 vs. Level 2	24.579	
Respondent * Time	Level 1 vs. Level 2	Level 1 vs. Level 2	.900	.006
	Level 2 vs. Level 3	Level 1 vs. Level 2	67.600	.682
Error(Respondent*Time)	Level 1 vs. Level 2	Level 1 vs. Level 2	141.789	
	Level 2 vs. Level 3	Level 1 vs. Level 2	99.156	

Tests of Within-Subjects Contrasts

Measure: SSQtotal

Source	Respondent	Time	Sig.	Partial Eta Squared
Respondent	Level 1 vs. Level 2		.048	.368
	Level 2 vs. Level 3		.161	.206
Error(Respondent)	Level 1 vs. Level 2			
	Level 2 vs. Level 3			
Time		Level 1 vs. Level 2	.127	.239
Error(Time)		Level 1 vs. Level 2		
Respondent * Time	Level 1 vs. Level 2	Level 1 vs. Level 2	.938	.001
	Level 2 vs. Level 3	Level 1 vs. Level 2	.430	.070
Error(Respondent*Time)	Level 1 vs. Level 2	Level 1 vs. Level 2		
	Level 2 vs. Level 3	Level 1 vs. Level 2		

Tests of Between-Subjects Effects

Measure: SSQtotal

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	16933.225	1	16933.225	441.775	.000	.980
Error	344.969	9	38.330			

Parameter Estimates

Dependent Variable	Parameter	B	Std. Error	t	Sig.	95% ... Lower Bound
SSQ pupil pre	Intercept	46.300	1.506	30.745	.000	42.893
SSQ pupil post	Intercept	43.000	2.216	19.403	.000	37.987
SSQ teacher pre	Intercept	38.200	3.844	9.939	.000	29.505
SSQ teacher post	Intercept	34.600	3.899	8.873	.000	25.779
SSQ parent pre	Intercept	42.900	2.627	16.333	.000	36.958
SSQ parent post	Intercept	41.900	3.588	11.676	.000	33.782

Parameter Estimates

Dependent Variable	Parameter	95% ... Upper Bound	Partial Eta Squared
SSQ pupil pre	Intercept	49.707	.991
SSQ pupil post	Intercept	48.013	.977
SSQ teacher pre	Intercept	46.895	.916
SSQ teacher post	Intercept	43.421	.897
SSQ parent pre	Intercept	48.842	.967
SSQ parent post	Intercept	50.018	.938

Estimated Marginal Means

1. Time

Estimates

Measure: SSQtotal

Time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	42.467	2.053	37.822	47.111
2	39.833	2.163	34.940	44.727

Pairwise Comparisons

Measure: SSQtotal

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
1	2	2.633	1.568	.127	-.913	6.180
2	1	-2.633	1.568	.127	-6.180	.913

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.239	2.821[a]	1.000	9.000	.127	.239
Wilks' lambda	.761	2.821[a]	1.000	9.000	.127	.239
Hotelling's trace	.313	2.821[a]	1.000	9.000	.127	.239
Roy's largest root	.313	2.821[a]	1.000	9.000	.127	.239

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

2. Grand Mean

Measure: SSQtotal

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
41.150	1.958	36.721	45.579

3. Respondent

Estimates

Measure: SSQtotal

Respondent	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	44.650	1.529	41.190	48.110
2	36.400	3.602	28.253	44.547
3	42.400	2.834	35.989	48.811

Pairwise Comparisons

Measure: SSQtotal

(I) Respondent	(J) Respondent	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence[a]...
					Lower Bound
1	2	8.250	3.600	.143	-2.311
	3	2.250	2.677	1.000	-5.603
2	1	-8.250	3.600	.143	-18.811
	3	-6.000	3.924	.482	-17.511
3	1	-2.250	2.677	1.000	-10.103
	2	6.000	3.924	.482	-5.511

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Pairwise Comparisons

Measure: SSQtotal

(I) Respondent	(J) Respondent	95% Confidence [a] Upper Bound
1	2	18.811
	3	10.103
2	1	2.311
	3	5.511
3	1	5.603
	2	17.511

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.372	2.370[a]	2.000	8.000	.155	.372
Wilks' lambda	.628	2.370[a]	2.000	8.000	.155	.372
Hotelling's trace	.593	2.370[a]	2.000	8.000	.155	.372
Roy's largest root	.593	2.370[a]	2.000	8.000	.155	.372

Each F tests the multivariate effect of Respondent. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

4. Time * Respondent

Measure: SSQtotal

Time	Respondent	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
1	1	46.300	1.506	42.893	49.707
	2	38.200	3.844	29.505	46.895
	3	42.900	2.627	36.958	48.842
2	1	43.000	2.216	37.987	48.013
	2	34.600	3.899	25.779	43.421
	3	41.900	3.588	33.782	50.018

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Thesis Data Output

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Frequencies

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	Cases Used	Statistics are based on all cases with valid data.

Notes

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Statistics

		Social Communication Questionnaire	Age in months	MABC2pre manual dexterity	MABC2pre aiming and catching
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		13.6000	116.20	4.1500	11.4000
Std. Error of Mean		1.51438	4.816	1.01667	3.78653
Median		13.5000	114.00	5.0000	5.0000
Mode		13.00[a]	99[a]	5.00	5.00
Std. Deviation		4.78888	15.230	3.21498	11.97405
Variance		22.933	231.956	10.336	143.378
Skewness		-.017	.511	.369	1.288
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		.113	-1.299	-1.108	.937
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		16.00	41	8.50	36.00
Minimum		6.00	99	.50	1.00
Maximum		22.00	140	9.00	37.00
Percentiles	25	10.7500	102.50	1.0000	2.0000
	50	13.5000	114.00	5.0000	5.0000
	75	17.2500	132.50	6.0000	18.2500

Statistics

		MABC2pre balance	MABC2pre total	MABC2post manual dexterity	MABC2post aiming and catching
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		23.0000	4.6000	15.0000	26.8500
Std. Error of Mean		6.78561	1.11505	4.74459	7.01350
Median		20.5000	5.0000	9.0000	25.0000
Mode		2.00[a]	5.00[a]	9.00	25.00[a]
Std. Deviation		21.45797	3.52609	15.00370	22.17863
Variance		460.444	12.433	225.111	491.892
Skewness		.762	.170	1.552	.900
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		-.434	-1.652	2.601	1.522
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		62.00	8.50	49.00	74.50
Minimum		1.00	.50	1.00	.50
Maximum		63.00	9.00	50.00	75.00
Percentiles	25	2.0000	.8750	4.0000	4.2500
	50	20.5000	5.0000	9.0000	25.0000
	75	40.2500	9.0000	25.0000	37.0000

Statistics

		MABC2post balance	MABC2post total	SPP pupil pre scholastic competence	SPP pupil pre social competence
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		55.1000	23.5000	2.3300	2.7100
Std. Error of Mean		10.07246	6.29506	.20388	.16829
Median		50.0000	20.5000	2.4000	2.8000
Mode		25.00[a]	37.00	2.70	2.20[a]
Std. Deviation		31.85191	19.90673	.64472	.53219
Variance		1014.544	396.278	.416	.283
Skewness		.089	.730	.147	-.258
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		-1.555	-.070	-.127	-.672
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		89.00	62.00	2.20	1.70
Minimum		9.00	1.00	1.30	1.80
Maximum		98.00	63.00	3.50	3.50
Percentiles	25	25.0000	5.0000	1.7750	2.2000
	50	50.0000	20.5000	2.4000	2.8000
	75	91.0000	37.0000	2.7250	3.0750

Statistics

		SPP pupil pre athletic competence	SPP pupil pre physical apprearance	SPP pupil pre behavioural conduct	SPP pupil pre global self worth
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		2.1600	2.8800	2.6800	2.7500
Std. Error of Mean		.23674	.14360	.20966	.21820
Median		2.0000	2.9000	2.7500	2.8500
Mode		1.30[a]	3.00	2.30	2.00[a]
Std. Deviation		.74863	.45412	.66299	.69001
Variance		.560	.206	.440	.476
Skewness		.865	.634	-1.140	.222
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		.560	.817	1.901	-.456
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		2.40	1.60	2.30	2.20
Minimum		1.30	2.20	1.20	1.80
Maximum		3.70	3.80	3.50	4.00
Percentiles	25	1.6000	2.5000	2.3000	2.0000
	50	2.0000	2.9000	2.7500	2.8500
	75	2.7250	3.0750	3.2250	3.2250

Statistics

		SPP pupil post scholastic competence	SPP pupil post social competence	SPP pupil post athletic competence	SPP pupil post physical appearance
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		2.6000	2.7500	2.6600	3.1800
Std. Error of Mean		.21909	.25831	.20450	.22301
Median		2.7500	2.7500	2.3000	3.3500
Mode		1.80[a]	3.20[a]	2.30	2.80[a]
Std. Deviation		.69282	.81684	.64670	.70522
Variance		.480	.667	.418	.497
Skewness		-.003	-.086	1.133	-.690
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		-1.253	-1.687	.411	-.033
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		2.00	2.30	2.00	2.20
Minimum		1.70	1.50	2.00	1.80
Maximum		3.70	3.80	4.00	4.00
Percentiles	25	1.8000	2.0750	2.2000	2.7250
	50	2.7500	2.7500	2.3000	3.3500
	75	3.0750	3.6000	3.2250	3.7750

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Statistics

		SPP pupil post behavioural conduct	SPP pupil post global self worth	SPP parent pre scholastic competence	SPP parent pre social competence
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		2.8100	3.0800	2.6300	2.0800
Std. Error of Mean		.21932	.20591	.34835	.20645
Median		2.7000	3.2000	2.4500	1.8000
Mode		2.30	3.20[a]	1.60[a]	1.60
Std. Deviation		.69354	.65115	1.10156	.65286
Variance		.481	.424	1.213	.426
Skewness		1.018	-.115	.017	1.557
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		.043	-.460	-1.627	2.486
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		2.00	2.00	3.00	2.00
Minimum		2.00	2.00	1.00	1.60
Maximum		4.00	4.00	4.00	3.60
Percentiles	25	2.3000	2.6000	1.6000	1.6000
	50	2.7000	3.2000	2.4500	1.8000
	75	3.2500	3.4750	3.7000	2.3750

Statistics

		SPP parent pre athletic competence	SPP parent pre physical appreance	SPP parent pre behavioural conduct	SPP parent post scholastic competence
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		1.6400	3.8800	2.9000	2.7400
Std. Error of Mean		.20450	.06110	.18135	.30630
Median		1.6000	4.0000	2.8000	2.9500
Mode		1.00[a]	4.00	2.30[a]	1.60[a]
Std. Deviation		.64670	.19322	.57349	.96862
Variance		.418	.037	.329	.938
Skewness		1.039	-1.035	.605	-.358
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		.832	-1.224	-.413	-1.490
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		2.00	.40	1.70	2.70
Minimum		1.00	3.60	2.30	1.30
Maximum		3.00	4.00	4.00	4.00
Percentiles	25	1.0000	3.6000	2.3000	1.6000
	50	1.6000	4.0000	2.8000	2.9500
	75	2.0750	4.0000	3.3000	3.6000

Statistics

		SPP parent post social acceptance	SPP parent post athletic competence	SPP parent post physical apprearance	SPP parent post behavioural conduct
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		2.3100	1.6800	3.8600	2.8000
Std. Error of Mean		.18883	.24712	.10349	.34026
Median		2.0000	1.3000	4.0000	3.1500
Mode		2.00	1.00[a]	4.00	3.60
Std. Deviation		.59712	.78145	.32728	1.07600
Variance		.357	.611	.107	1.158
Skewness		1.300	1.161	-2.503	-.937
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		1.332	.535	6.212	-.362
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		2.00	2.30	1.00	3.00
Minimum		1.60	1.00	3.00	1.00
Maximum		3.60	3.30	4.00	4.00
Percentiles	25	2.0000	1.0000	3.9000	1.9750
	50	2.0000	1.3000	4.0000	3.1500
	75	2.7000	2.1500	4.0000	3.6000

Statistics

		SSQ pupil pre	SSQ pupil post	SSQ teacher pre	SSQ teacher post
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		46.3000	43.0000	38.2000	34.6000
Std. Error of Mean		1.50591	2.21610	3.84361	3.89929
Median		47.0000	45.5000	36.0000	36.5000
Mode		46.00	46.00	33.00	15.00[a]
Std. Deviation		4.76212	7.00793	12.15456	12.33063
Variance		22.678	49.111	147.733	152.044
Skewness		-.804	-.487	-.554	.199
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		-.019	-.710	1.172	.426
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		15.00	22.00	43.00	43.00
Minimum		37.00	31.00	13.00	15.00
Maximum		52.00	53.00	56.00	58.00
Percentiles	25	42.5000	37.0000	33.0000	25.2500
	50	47.0000	45.5000	36.0000	36.5000
	75	50.2500	48.2500	49.0000	42.2500

Statistics

		SSQ parent pre	SSQ parent post	SF pre attention	SF pre concentration
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		42.9000	41.9000	2.9000	2.9000
Std. Error of Mean		2.62657	3.58841	.37859	.40689
Median		43.5000	42.0000	3.0000	3.0000
Mode		36.00[a]	37.00[a]	2.00[a]	3.00
Std. Deviation		8.30596	11.34754	1.19722	1.28668
Variance		68.989	128.767	1.433	1.656
Skewness		-.537	-.485	.233	-.164
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		-.104	.895	-.369	-.430
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		27.00	40.00	4.00	4.00
Minimum		27.00	19.00	1.00	1.00
Maximum		54.00	59.00	5.00	5.00
Percentiles	25	36.0000	36.2500	2.0000	1.7500
	50	43.5000	42.0000	3.0000	3.0000
	75	51.0000	50.5000	4.0000	4.0000

Statistics

		SF pre completion rate	SF pre handwriting	SF post attention	SF post concentration
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		2.8000	2.9000	2.9500	2.9500
Std. Error of Mean		.29059	.40689	.35316	.32016
Median		3.0000	3.0000	2.5000	3.0000
Mode		3.00	3.00	2.00	2.00
Std. Deviation		.91894	1.28668	1.11679	1.01242
Variance		.844	1.656	1.247	1.025
Skewness		-.601	-.164	.679	.871
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		.396	-.430	-.936	.278
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		3.00	4.00	3.00	3.00
Minimum		1.00	1.00	2.00	2.00
Maximum		4.00	5.00	5.00	5.00
Percentiles	25	2.0000	1.7500	2.0000	2.0000
	50	3.0000	3.0000	2.5000	3.0000
	75	3.2500	4.0000	4.0000	3.6250

Statistics

		SF post completion rate	SF post handwriting	SDQ teacher pre emotional	SDQ teacher pre conduct
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		2.8000	3.0000	3.6000	1.9000
Std. Error of Mean		.35901	.39441	.68638	.76667
Median		3.0000	3.0000	3.5000	1.0000
Mode		3.00	2.00[a]	6.00	.00
Std. Deviation		1.13529	1.24722	2.17051	2.42441
Variance		1.289	1.556	4.711	5.878
Skewness		.478	.000	-.333	1.315
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		.552	-.912	-1.154	.865
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		4.00	4.00	6.00	7.00
Minimum		1.00	1.00	.00	.00
Maximum		5.00	5.00	6.00	7.00
Percentiles	25	2.0000	2.0000	1.7500	.0000
	50	3.0000	3.0000	3.5000	1.0000
	75	3.2500	4.0000	6.0000	3.5000

Statistics

		SDQ teacher pre hyperactivity	SDQ teacher pre peer relationship	SDQ teacher pre prosocial behaviour	SDQ teacher pre total
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		6.4000	2.9000	6.5000	14.8000
Std. Error of Mean		1.00222	.70632	.89753	1.77514
Median		7.0000	2.5000	6.0000	14.5000
Mode		4.00[a]	1.00[a]	6.00	10.00
Std. Deviation		3.16930	2.23358	2.83823	5.61348
Variance		10.044	4.989	8.056	31.511
Skewness		-.773	.754	-.492	.184
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		.282	-.178	.045	-.714
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		10.00	7.00	9.00	18.00
Minimum		.00	.00	1.00	6.00
Maximum		10.00	7.00	10.00	24.00
Percentiles	25	4.0000	1.0000	4.7500	10.0000
	50	7.0000	2.5000	6.0000	14.5000
	75	9.2500	4.5000	9.2500	20.2500

Statistics

		SDQ teacher post emotional	SDQ teacher post conduct	SDQ teacher post hyperactivity	SDQ teacher post peer relationship
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		3.0000	2.4000	6.5000	2.4000
Std. Error of Mean		.55777	.65320	.94575	.58119
Median		3.5000	2.5000	7.0000	2.0000
Mode		4.00	.00	5.00[a]	1.00
Std. Deviation		1.76383	2.06559	2.99073	1.83787
Variance		3.111	4.267	8.944	3.378
Skewness		-.152	-.011	-.981	.736
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		-.190	-1.845	1.432	-.017
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		6.00	5.00	10.00	6.00
Minimum		.00	.00	.00	.00
Maximum		6.00	5.00	10.00	6.00
Percentiles	25	1.7500	.0000	5.0000	1.0000
	50	3.5000	2.5000	7.0000	2.0000
	75	4.0000	4.2500	8.5000	4.0000

Statistics

		SDQ teacher post prosocial	SDQ teacher post total	SDQ parent pre emotional	SDQ parent pre conduct
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		4.3000	14.3000	4.8000	1.9000
Std. Error of Mean		.85700	1.49108	.78599	.56667
Median		3.5000	14.0000	3.5000	1.5000
Mode		6.00	10.00[a]	3.00	1.00
Std. Deviation		2.71006	4.71522	2.48551	1.79196
Variance		7.344	22.233	6.178	3.211
Skewness		.944	.441	.664	1.344
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		.763	-.570	-1.220	2.297
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		9.00	15.00	7.00	6.00
Minimum		1.00	8.00	2.00	.00
Maximum		10.00	23.00	9.00	6.00
Percentiles	25	2.0000	10.0000	3.0000	.7500
	50	3.5000	14.0000	3.5000	1.5000
	75	6.0000	18.0000	7.2500	3.0000

Statistics

		SDQ parent pre hyperactivity	SDQ parent pre peer relationship	SDQ parent pre prosocial	SDQ parent pre total
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		7.1000	4.1000	6.7000	17.9000
Std. Error of Mean		.70632	.65744	.98939	1.66966
Median		7.5000	4.0000	7.5000	18.0000
Mode		7.00[a]	4.00	9.00	14.00[a]
Std. Deviation		2.23358	2.07900	3.12872	5.27994
Variance		4.989	4.322	9.789	27.878
Skewness		-.754	.113	-1.204	.183
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		-.178	-1.001	.960	-.834
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		7.00	6.00	10.00	17.00
Minimum		3.00	1.00	.00	10.00
Maximum		10.00	7.00	10.00	27.00
Percentiles	25	5.5000	2.0000	4.0000	13.7500
	50	7.5000	4.0000	7.5000	18.0000
	75	9.0000	6.2500	9.0000	22.0000

Statistics

		SDQ parent post emotional	SDQ parent post conduct	SDQ parent post hyperactivity	SDQ parent post peer relationship
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		3.8000	2.7000	6.4000	3.4000
Std. Error of Mean		.61101	.65064	.45216	.65320
Median		4.0000	2.0000	6.5000	3.0000
Mode		5.00	2.00	8.00	2.00[a]
Std. Deviation		1.93218	2.05751	1.42984	2.06559
Variance		3.733	4.233	2.044	4.267
Skewness		-.457	.695	-.319	.083
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		.843	-.556	-1.163	-.953
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		7.00	6.00	4.00	6.00
Minimum		.00	.00	4.00	.00
Maximum		7.00	6.00	8.00	6.00
Percentiles	25	2.7500	1.0000	5.0000	2.0000
	50	4.0000	2.0000	6.5000	3.0000
	75	5.0000	4.5000	8.0000	6.0000

Statistics

		SDQ parent post prosocial	SDQ parent post total	DCDQ pre control movement	DCDQ pre handwriting
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		6.1000	16.3000	15.5000	10.3000
Std. Error of Mean		1.15902	1.27410	.87242	1.07548
Median		7.0000	17.5000	15.0000	11.0000
Mode		.00[a]	17.00[a]	15.00	5.00[a]
Std. Deviation		3.66515	4.02906	2.75882	3.40098
Variance		13.433	16.233	7.611	11.567
Skewness		-.861	-1.484	2.639	-.554
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		-.324	2.484	7.768	-.723
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		10.00	14.00	10.00	10.00
Minimum		.00	7.00	13.00	5.00
Maximum		10.00	21.00	23.00	15.00
Percentiles	25	3.7500	13.7500	14.0000	7.2500
	50	7.0000	17.5000	15.0000	11.0000
	75	9.2500	19.0000	15.2500	13.0000

Statistics

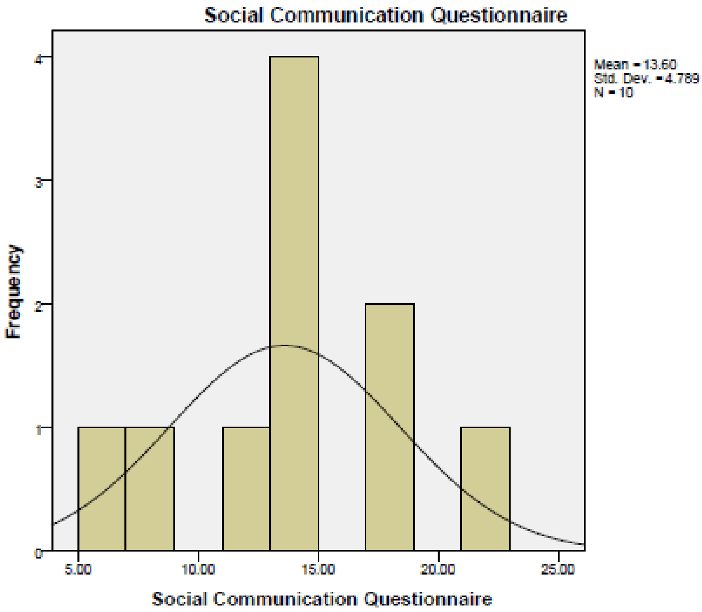
		DCDQ pre coordination	DCDQ pre total	DCDQ post control movement	DCDQ post handwriting
N	Valid	10	10	10	10
	Missing	0	0	0	0
Mean		11.2000	37.0000	19.5000	10.7000
Std. Error of Mean		.72725	1.24722	1.19490	.76085
Median		11.0000	36.5000	20.0000	11.0000
Mode		9.00[a]	35.00	20.00[a]	11.00
Std. Deviation		2.29976	3.94405	3.77859	2.40601
Variance		5.289	15.556	14.278	5.789
Skewness		.312	-.190	-.626	-.397
Std. Error of Skewness		.687	.687	.687	.687
Kurtosis		-.948	-1.464	-.301	.513
Std. Error of Kurtosis		1.334	1.334	1.334	1.334
Range		7.00	11.00	12.00	8.00
Minimum		8.00	31.00	13.00	6.00
Maximum		15.00	42.00	25.00	14.00
Percentiles	25	9.0000	34.2500	16.2500	9.0000
	50	11.0000	36.5000	20.0000	11.0000
	75	13.2500	41.0000	22.0000	12.5000

Statistics

		DCDQ post coordination	DCDQ post total
N	Valid	10	10
	Missing	0	0
Mean		12.7000	42.9000
Std. Error of Mean		1.22066	2.28254
Median		13.0000	43.0000
Mode		10.00	49.00
Std. Deviation		3.86005	7.21803
Variance		14.900	52.100
Skewness		-.121	-.356
Std. Error of Skewness		.687	.687
Kurtosis		-1.458	-1.189
Std. Error of Kurtosis		1.334	1.334
Range		11.00	21.00
Minimum		7.00	31.00
Maximum		18.00	52.00
Percentiles	25	9.5000	37.0000
	50	13.0000	43.0000
	75	16.2500	49.2500

a. Multiple modes exist. The smallest value is shown

Histogram


Social Communication Questionnaire
Mean = 13.60
Std. Dev. = 4.789
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3
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5.00
10.00
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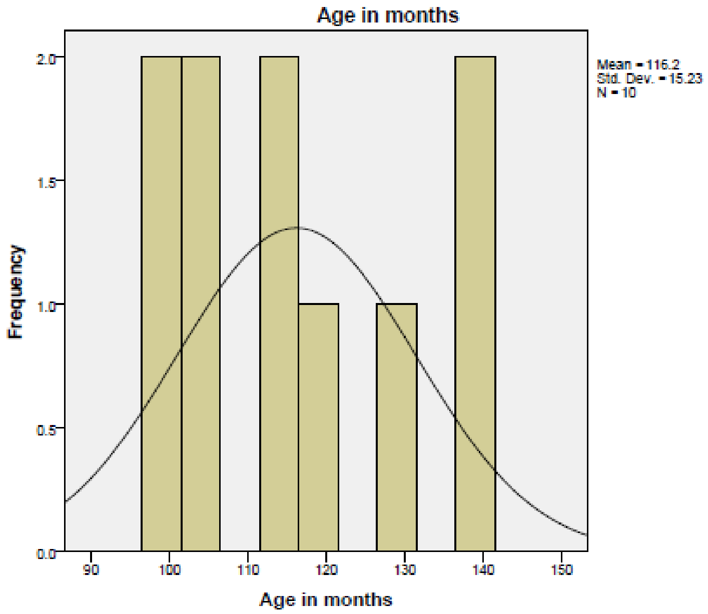
20.00
25.00
Social Communication Questionnaire


Age in months
Mean = 116.2
Std. Dev. = 15.23
N = 10
Frequency
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1.5
1.0
0.5
0.0
90
100
110
120
130
140
150
Age in months

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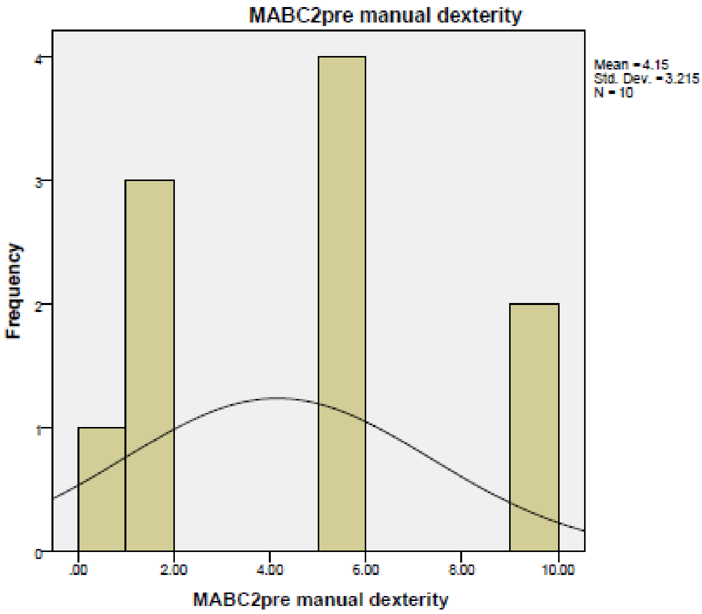
MABC2pre manual dexterity
Mean = 4.15
Std. Dev. = 3.215
N = 10
Frequency
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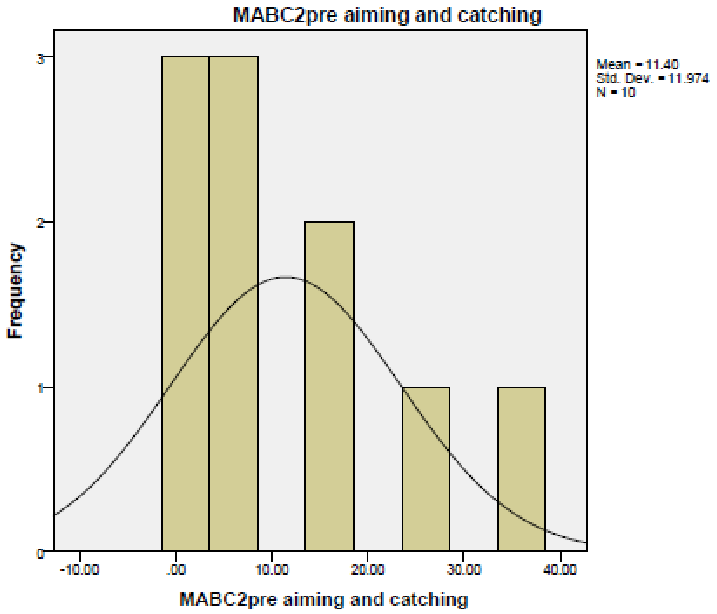
1
2
3
4
.00
2.00
4.00
6.00
8.00
10.00
MABC2pre manual dexterity


MABC2pre aiming and catching
Frequency
Mean = 11.40
Std. Dev. = 11.974
N = 10
MABC2pre aiming and catching

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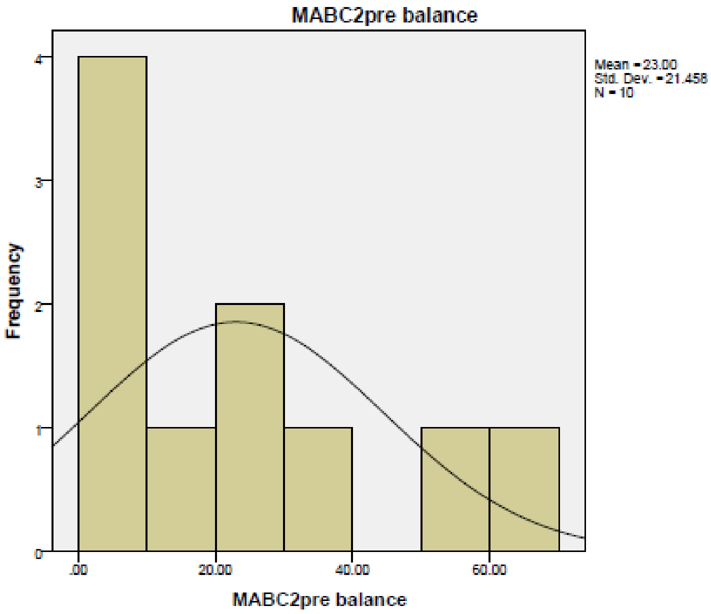
MABC2pre balance
Mean = 23.00
Std. Dev. = 21.458
N = 10
Frequency
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1
2
3
4
.00
20.00
40.00
60.00
MABC2pre balance

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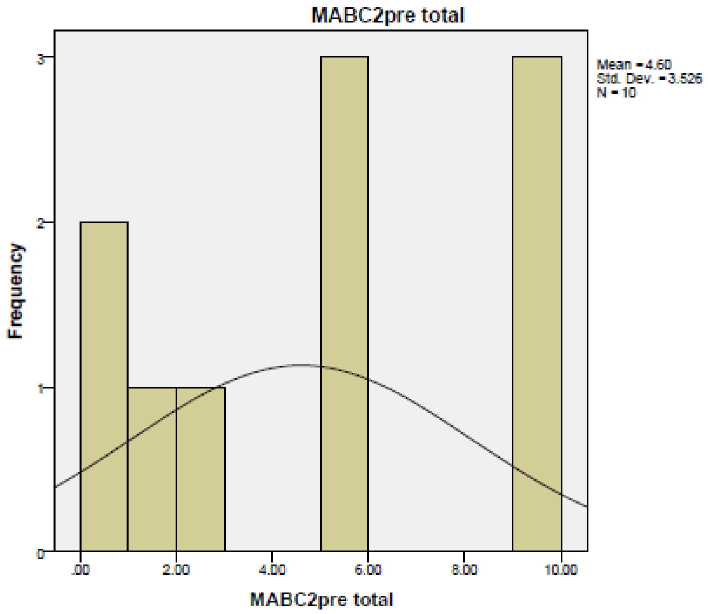
MABC2pre total
Mean = 4.60
Std. Dev. = 3.526
N = 10
Frequency
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2
3
.00
2.00
4.00
6.00
8.00
10.00
MABC2pre total

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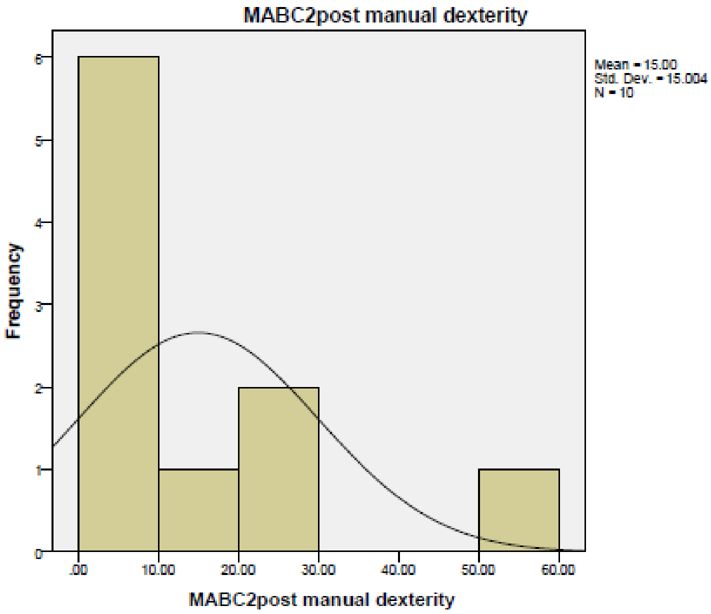

MABC2post manual dexterity
Mean = 15.00
Std. Dev. = 15.004
N = 10
Frequency
0
1
2
3
4
5
6
.00
10.00
20.00
30.00
40.00
50.00
60.00
MABC2post manual dexterity

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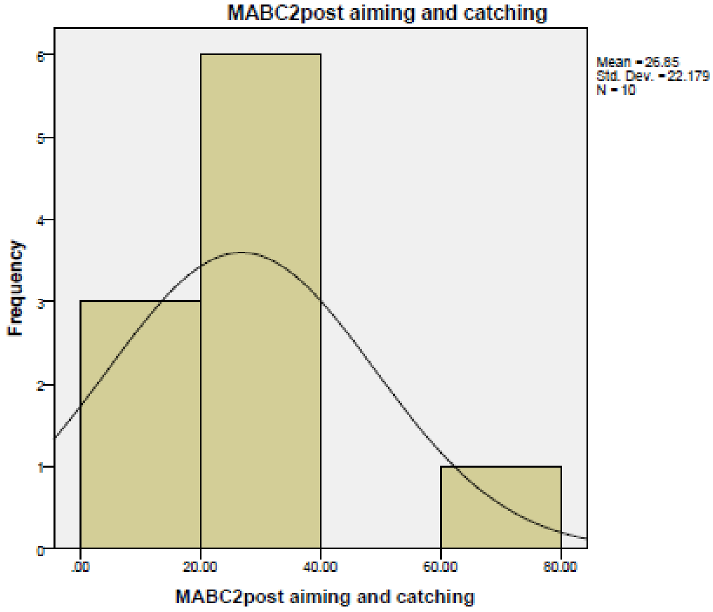
MABC2post aiming and catching
Mean = 26.85
Std. Dev. = 22.179
N = 10
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2
3
4
5
6
.00
20.00
40.00
60.00
80.00
MABC2post aiming and catching

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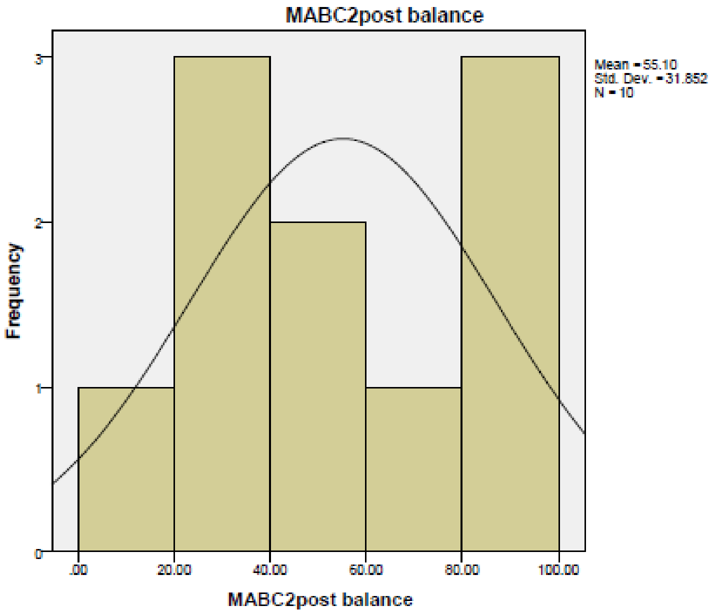
MABC2post balance
Mean = 55.10
Std. Dev. = 31.852
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2
3
.00
20.00
40.00
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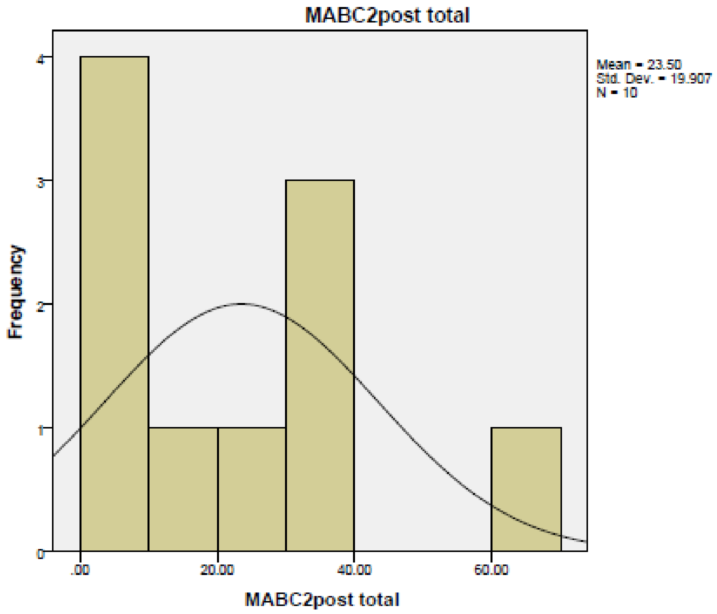
80.00
100.00
MABC2post balance


MABC2post total
Mean = 23.50
Std. Dev. = 19.907
N = 10
Frequency
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2
3
4
.00
20.00
40.00
60.00
MABC2post total

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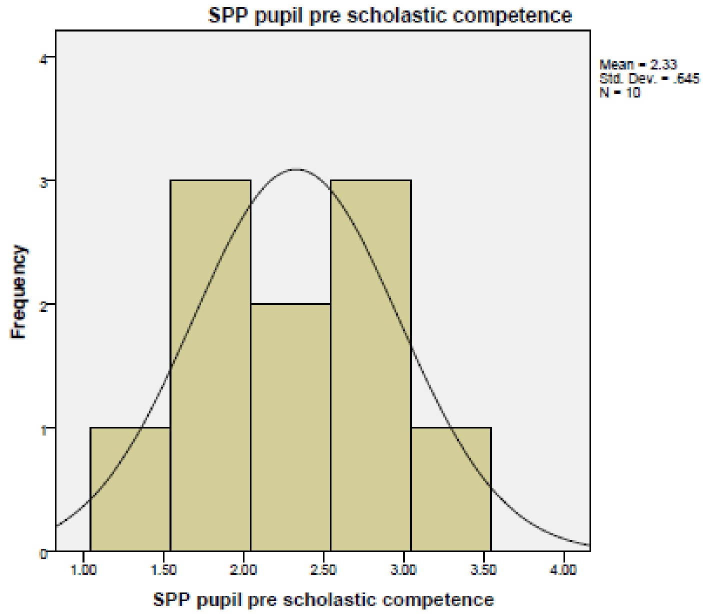
SPP pupil pre scholastic competence
Mean = 2.33
Std. Dev. = .645
N = 10
Frequency
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1
2
3
4
1.00
1.50
2.00
2.50
3.00
3.50
4.00
SPP pupil pre scholastic competence

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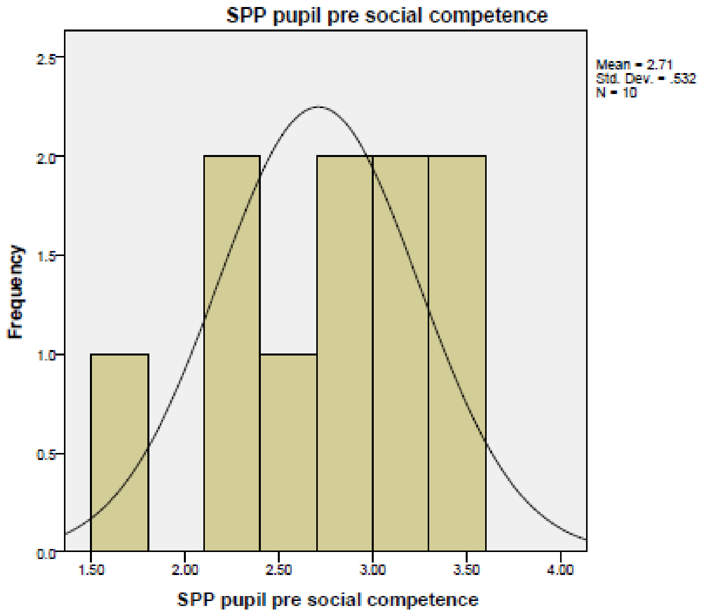
SPP pupil pre social competence
Mean = 2.71
Std. Dev. = .532
N = 10
Frequency
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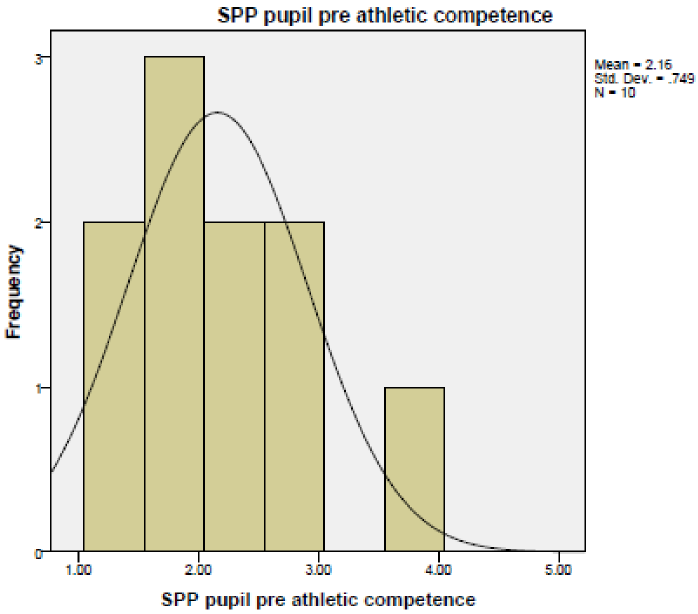
1.5
2.0
2.5
1.50
2.00
2.50
3.00
3.50
4.00
SPP pupil pre social competence


SPP pupil pre athletic competence
Mean = 2.16
Std. Dev. = .749
N = 10
Frequency
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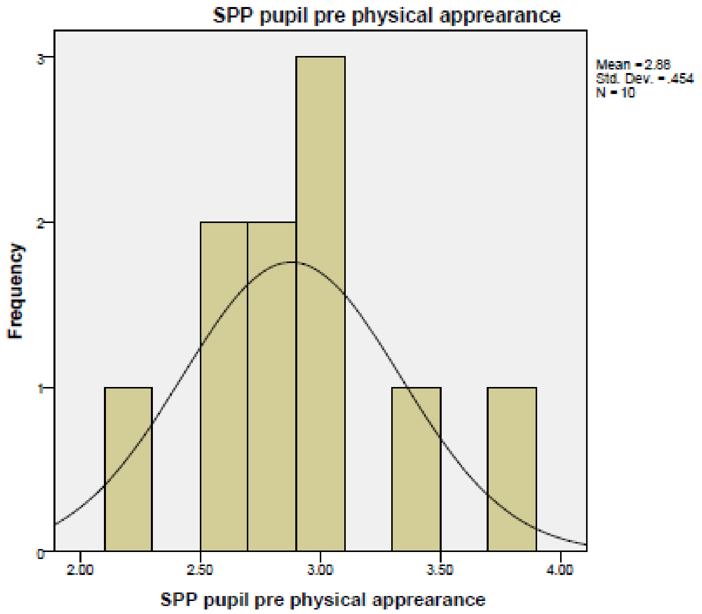
1
2
3
1.00
2.00
3.00
4.00
5.00
SPP pupil pre athletic competence


SPP pupil pre physical apprearance
Mean =2.88
Std. Dev. =.454
N =10
Frequency
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1
2
3
2.00
2.50
3.00
3.50
4.00
SPP pupil pre physical apprearance

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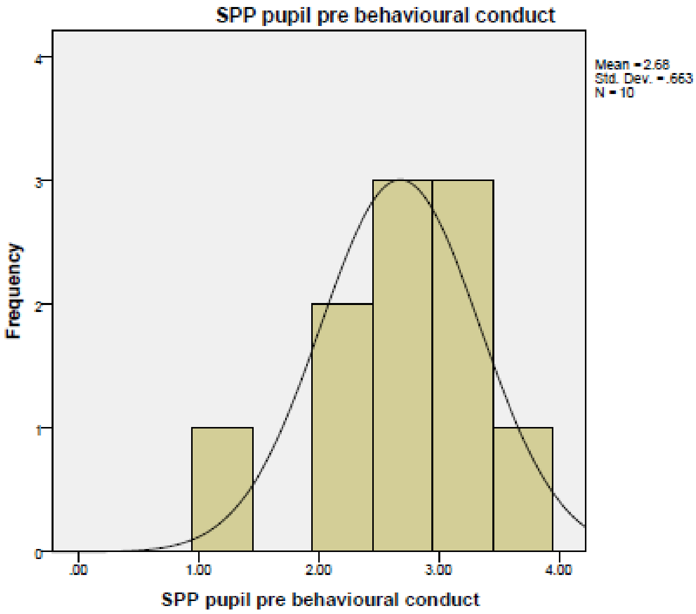
SPP pupil pre behavioural conduct
Mean = 2.68
Std. Dev. = .663
N = 10
Frequency
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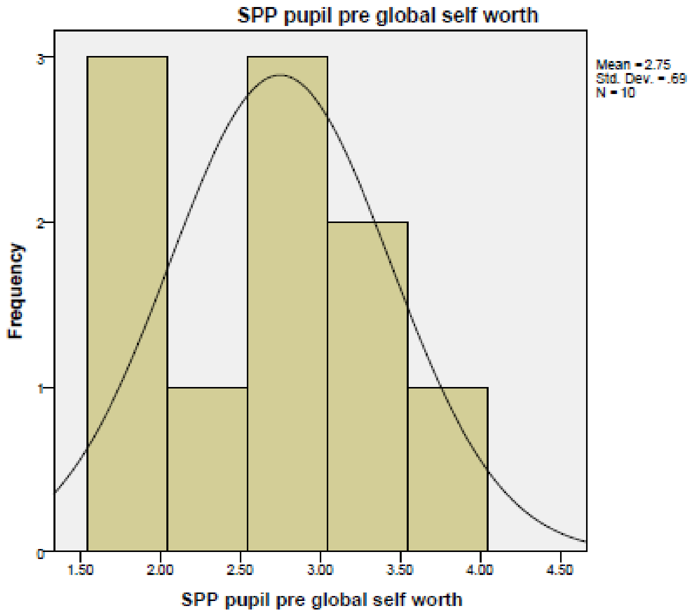
4.00
SPP pupil pre behavioural conduct


SPP pupil pre global self worth
Mean = 2.75
Std. Dev. = .69
N = 10
Frequency
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2
3
1.50
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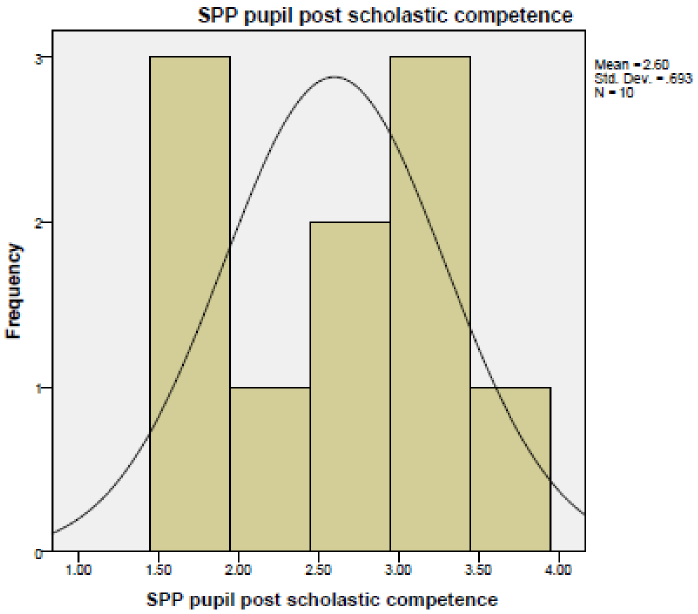
2.50
3.00
3.50
4.00
4.50
SPP pupil pre global self worth


SPP pupil post scholastic competence
Mean = 2.60
Std. Dev. = .693
N = 10
Frequency
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1
2
3
1.00
1.50
2.00
2.50
3.00
3.50
4.00
SPP pupil post scholastic competence

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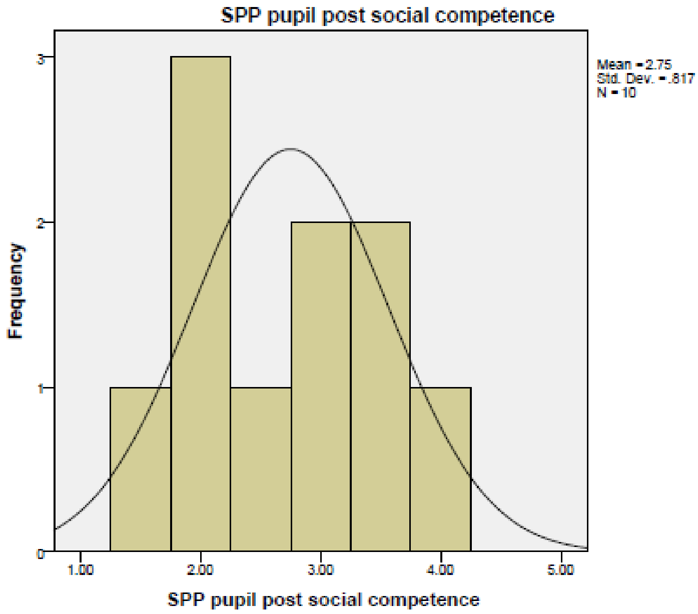
SPP pupil post social competence
Mean =2.75
Std. Dev. =.817
N =10
Frequency
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1
2
3
1.00
2.00
3.00
4.00
5.00
SPP pupil post social competence

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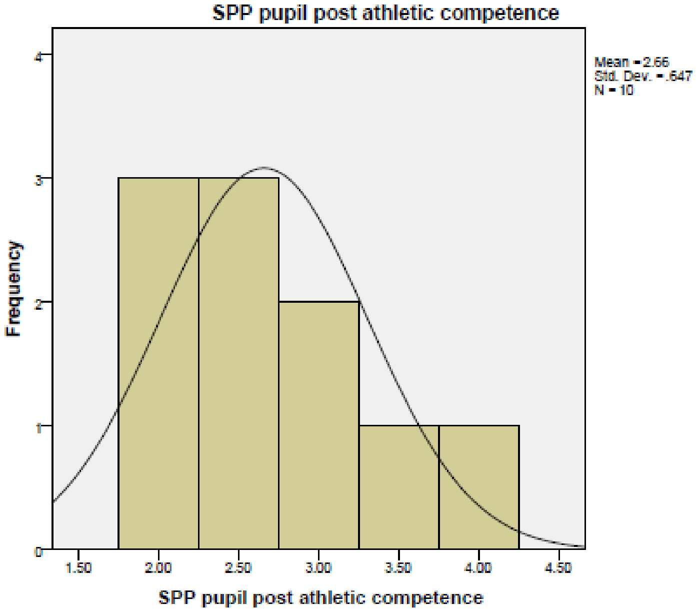
SPP pupil post athletic competence
Mean = 2.66
Std. Dev. = .647
N = 10
Frequency
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1
2
3
4
1.50
2.00
2.50
3.00
3.50
4.00
4.50
SPP pupil post athletic competence

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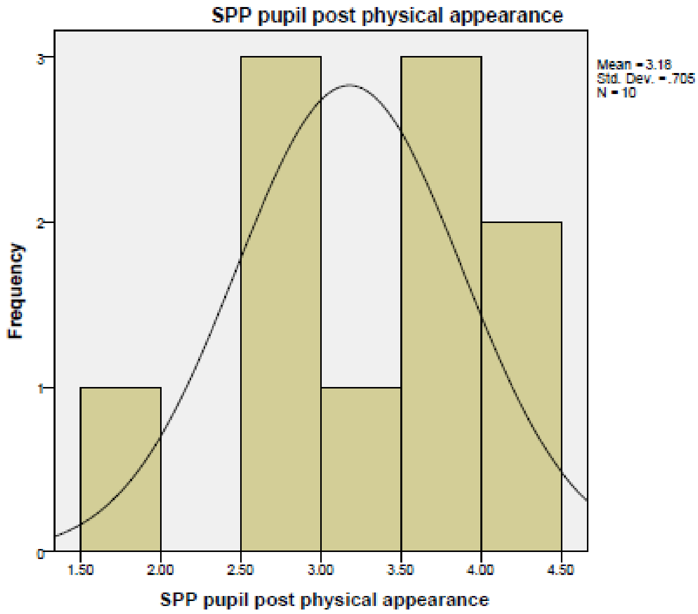
SPP pupil post physical appearance
Mean = 3.18
Std. Dev. = .705
N = 10
Frequency
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3
1.50
2.00
2.50
3.00
3.50
4.00
4.50
SPP pupil post physical appearance

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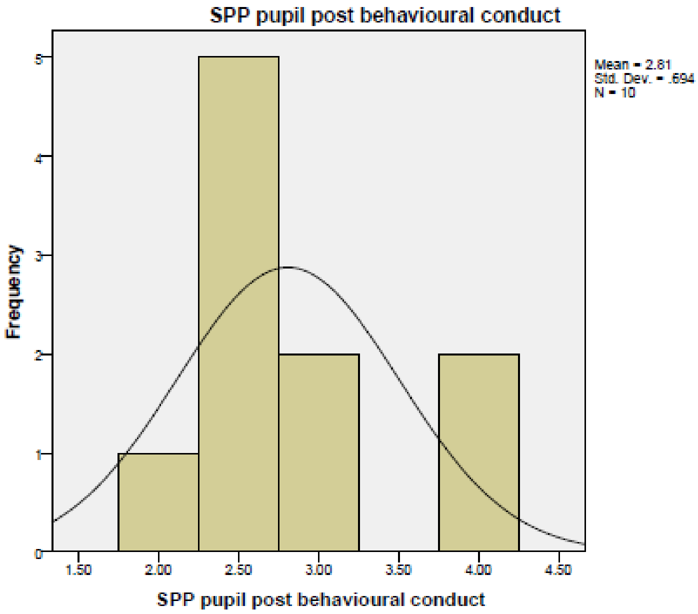
SPP pupil post behavioural conduct
Mean = 2.81
Std. Dev. = .694
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Frequency
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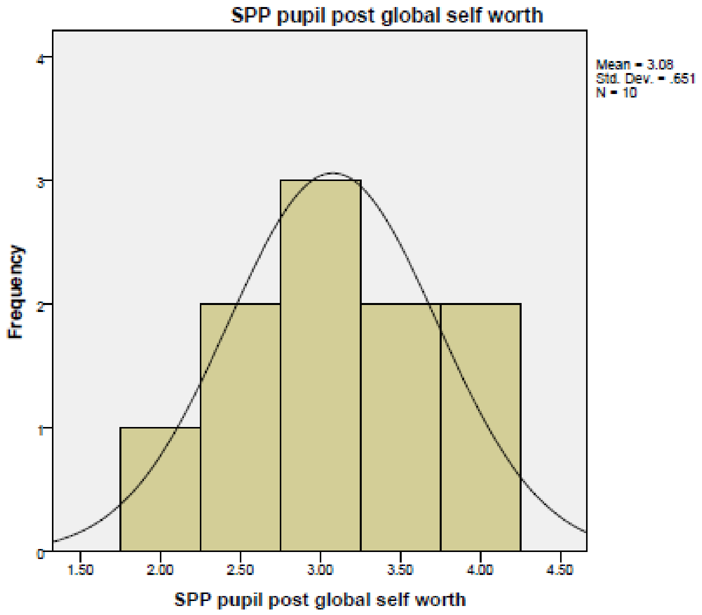
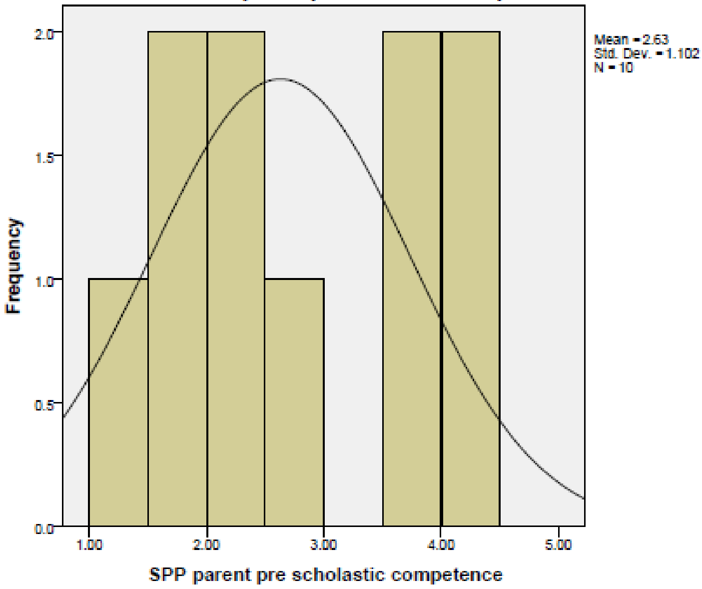
4
5
1.50
2.00
2.50
3.00
3.50
4.00
4.50
SPP pupil post behavioural conduct


SPP pupil post global self worth
Mean = 3.08
Std. Dev. = .651
N = 10
Frequency
0
1
2
3
4
1.50
2.00
2.50
3.00
3.50
4.00
4.50
SPP pupil post global self worth

SPP parent pre scholastic competence



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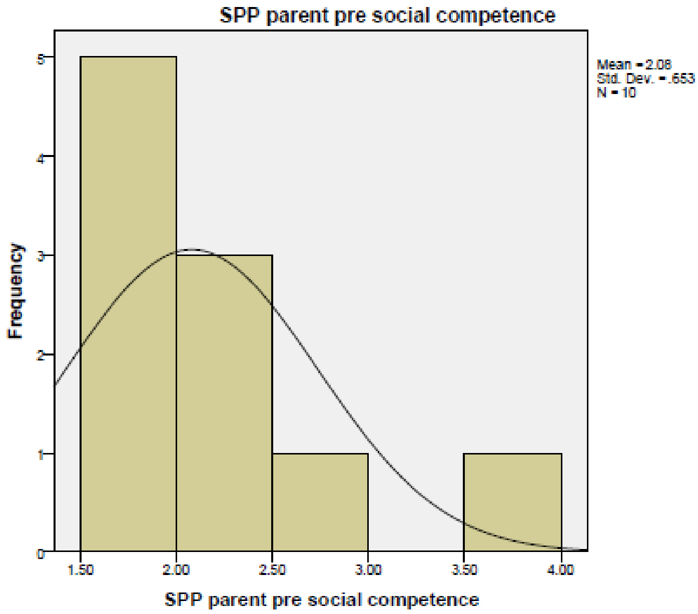
SPP parent pre social competence
Mean = 2.08
Std. Dev. = .653
N = 10
Frequency
0
1
2
3
4
5
1.50
2.00
2.50
3.00
3.50
4.00
SPP parent pre social competence

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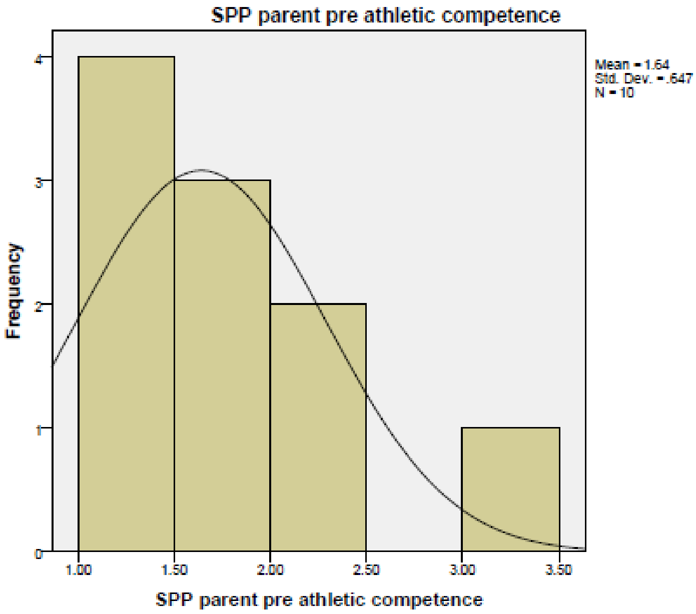
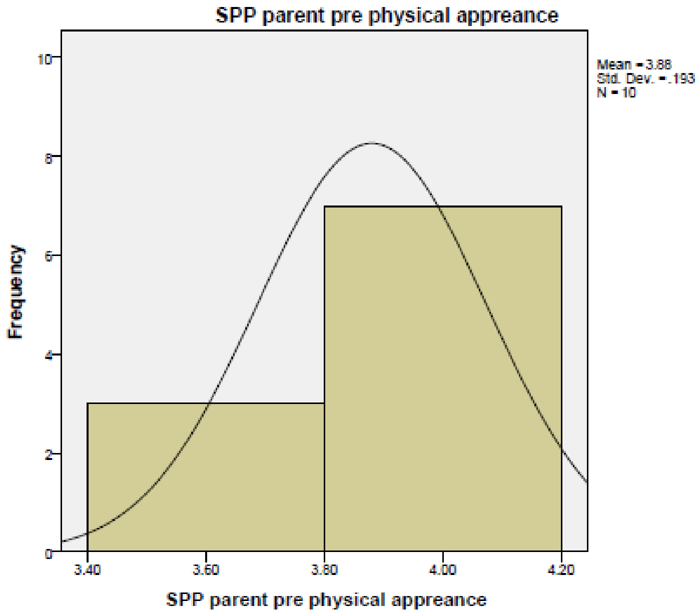

SPP parent pre athletic competence
Mean = 1.64
Std. Dev. = .647
N = 10
Frequency
0
1
2
3
4
1.00
1.50
2.00
2.50
3.00
3.50
SPP parent pre athletic competence


SPP parent pre physical appreance
Mean = 3.88
Std. Dev. = .193
N = 10
Frequency
0
2
4
6
8
10
3.40
3.60
3.80
4.00
4.20
SPP parent pre physical appreance

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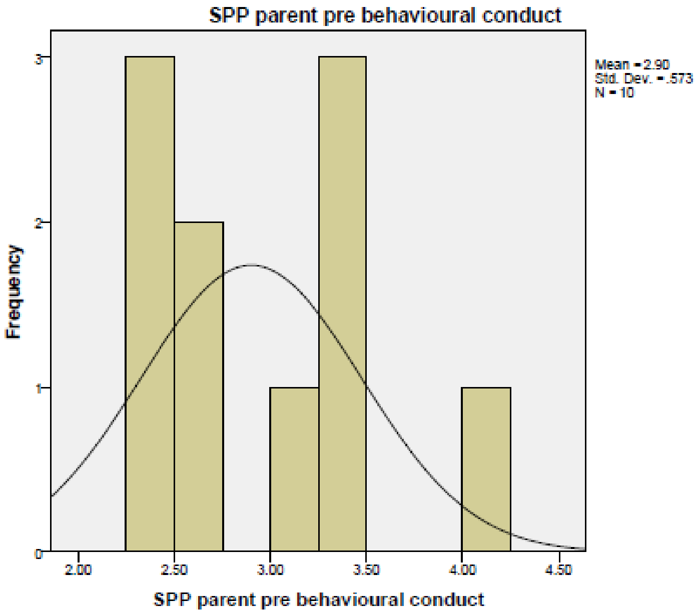
SPP parent pre behavioural conduct
Mean = 2.90
Std. Dev. = .573
N = 10
Frequency
0
1
2
3
2.00
2.50
3.00
3.50
4.00
4.50
SPP parent pre behavioural conduct

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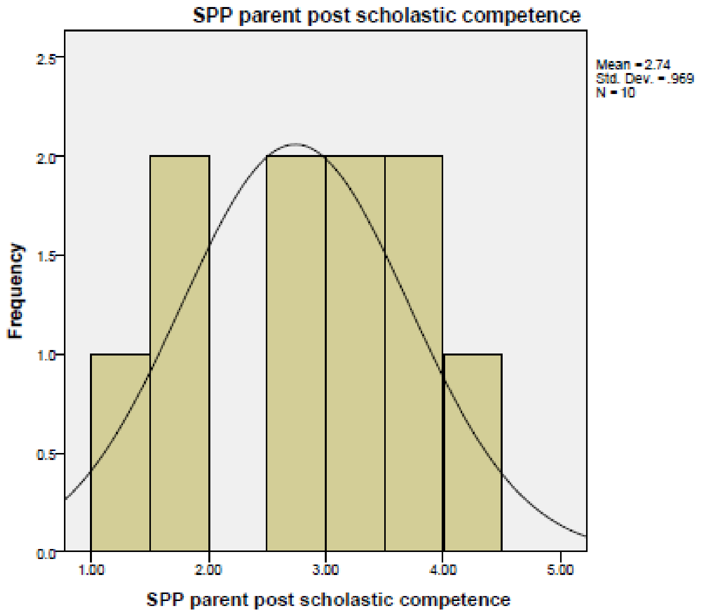
SPP parent post scholastic competence
Mean =2.74
Std. Dev. =.969
N =10
Frequency
2.5
2.0
1.5
1.0
0.5
0.0
1.00
2.00
3.00
4.00
5.00
SPP parent post scholastic competence

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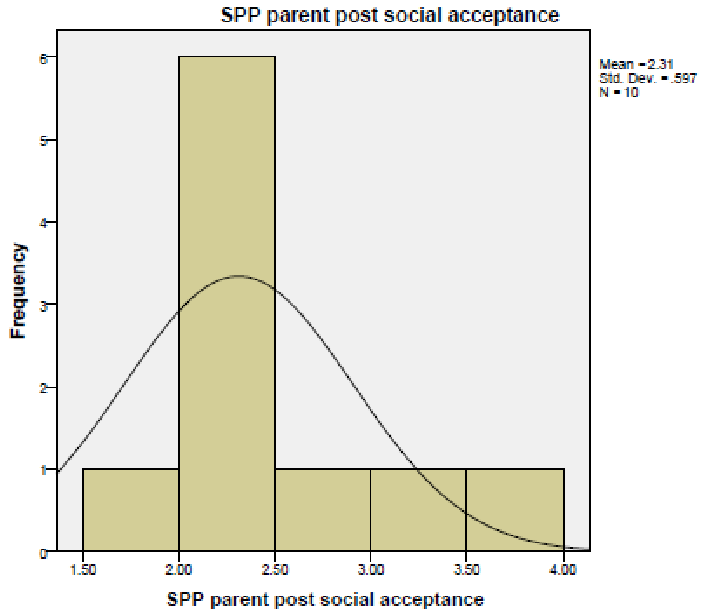

SPP parent post social acceptance
Mean = 2.31
Std. Dev. = .597
N = 10
Frequency
0
1
2
3
4
5
6
1.50
2.00
2.50
3.00
3.50
4.00
SPP parent post social acceptance

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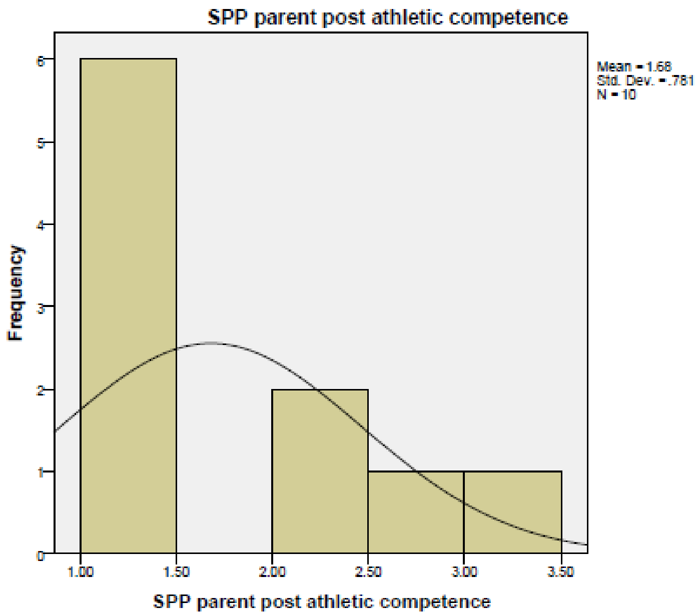
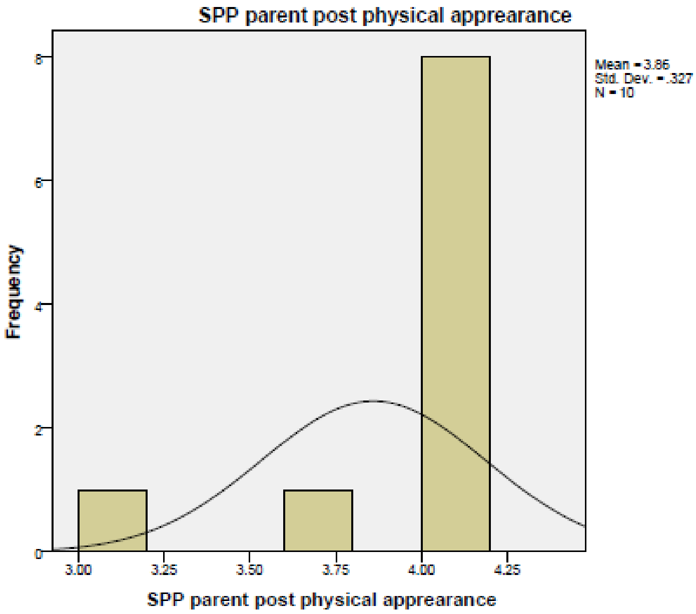
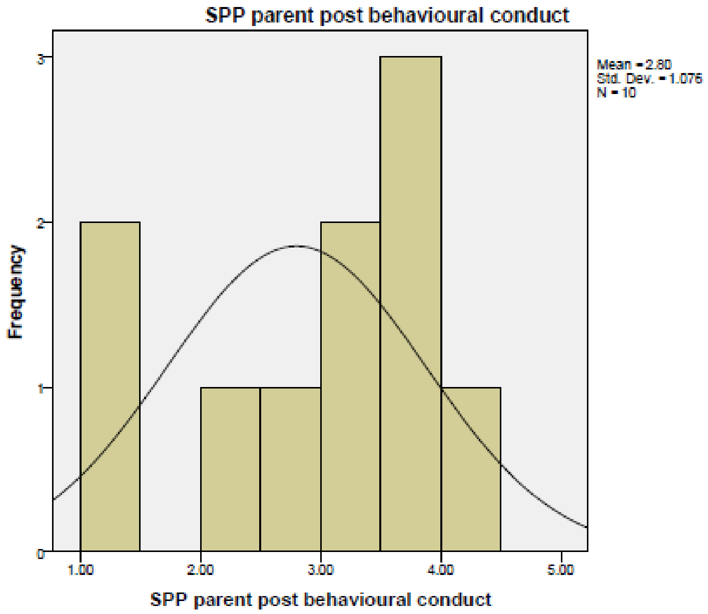

SPP parent post athletic competence
Frequency
0
1
2
3
4
5
6
1.00
1.50
2.00
2.50
3.00
3.50
SPP parent post athletic competence
Mean = 1.68
Std. Dev. = .781
N = 10


SPP parent post physical apprearance
Mean = 3.86
Std. Dev. = .327
N = 10
Frequency
0
2
4
6
8
3.00
3.25
3.50
3.75
4.00
4.25
SPP parent post physical apprearance


SPP parent post behavioural conduct
Mean = 2.80
Std. Dev. = 1.075
N = 10
Frequency
0
1
2
3
1.00
2.00
3.00
4.00
5.00
SPP parent post behavioural conduct

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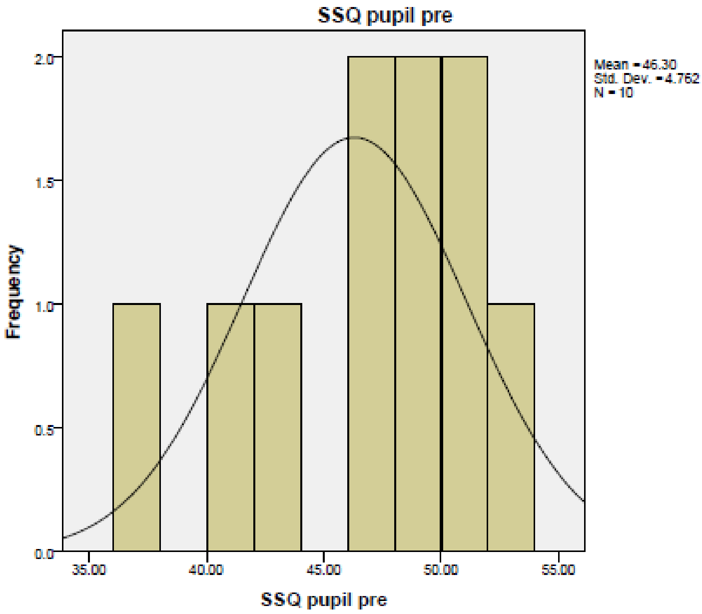
SSQ pupil pre
Mean = 46.30
Std. Dev. = 4.762
N = 10
Frequency
2.0
1.5
1.0
0.5
0.0
35.00
40.00
45.00
50.00
55.00
SSQ pupil pre

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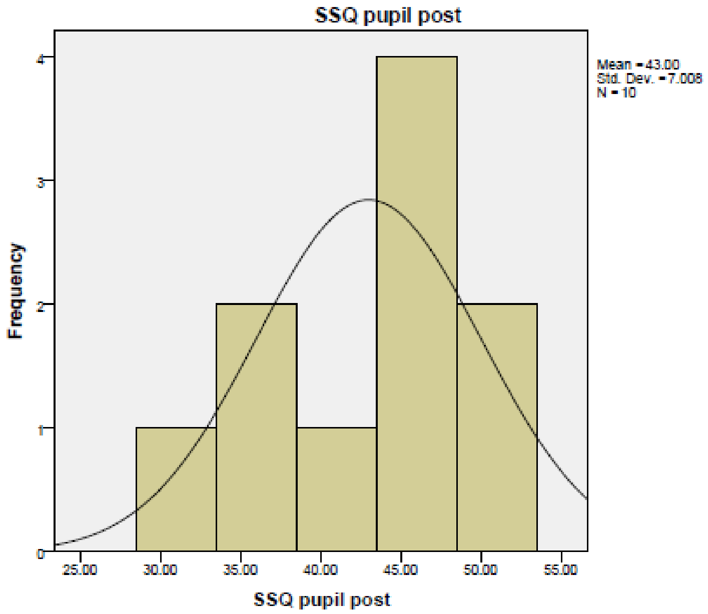
SSQ pupil post
Mean = 43.00
Std. Dev. = 7.008
N = 10
Frequency
0
1
2
3
4
25.00
30.00
35.00
40.00
45.00
50.00
55.00
SSQ pupil post

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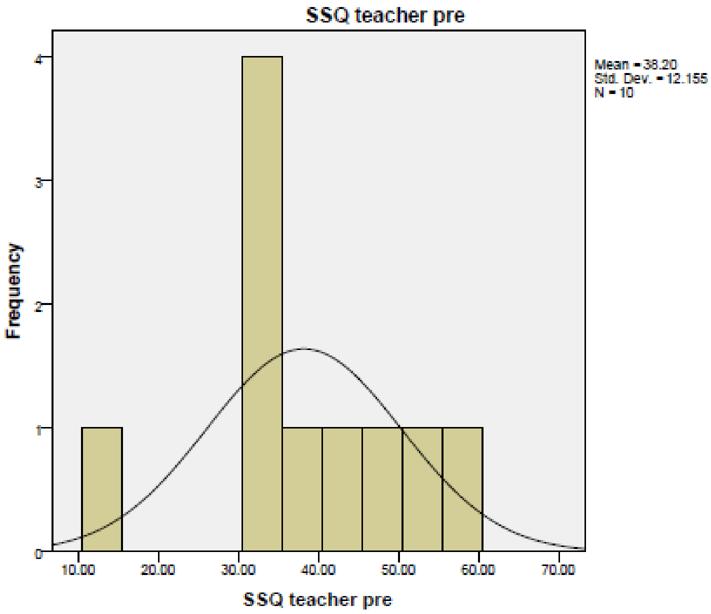
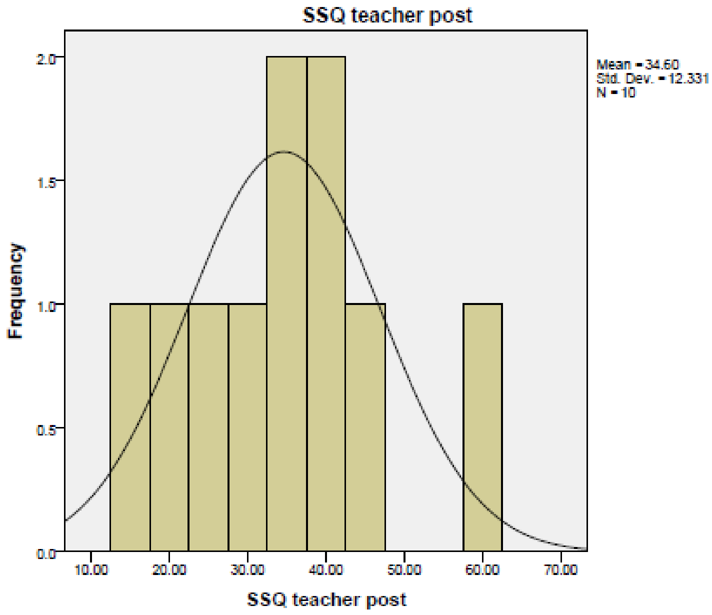

SSQ teacher pre
Mean = 38.20
Std. Dev. = 12.155
N = 10
Frequency
0
1
2
3
4
10.00
20.00
30.00
40.00
50.00
60.00
70.00
SSQ teacher pre


SSQ teacher post
Mean = 34.60
Std. Dev. = 12.331
N = 10
Frequency
2.0
1.5
1.0
0.5
0.0
10.00
20.00
30.00
40.00
50.00
60.00
70.00
SSQ teacher post

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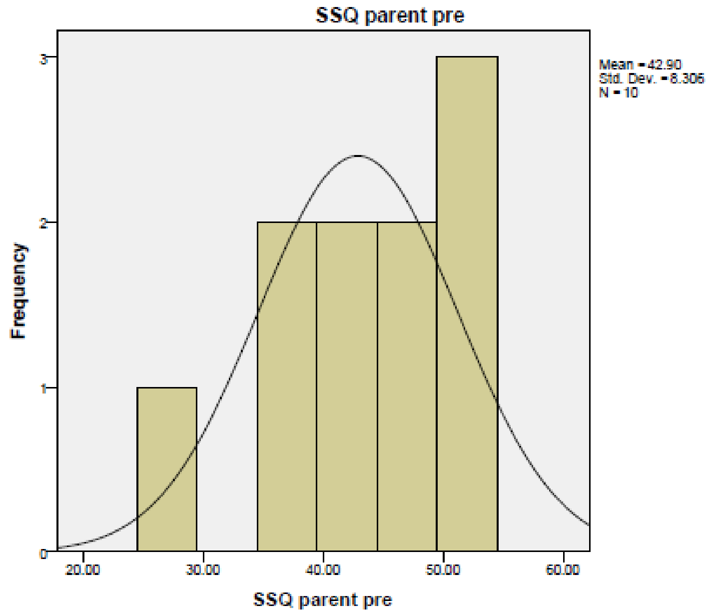
SSQ parent pre
Mean = 42.90
Std. Dev. = 8.306
N = 10
Frequency
0
1
2
3
20.00
30.00
40.00
50.00
60.00
SSQ parent pre

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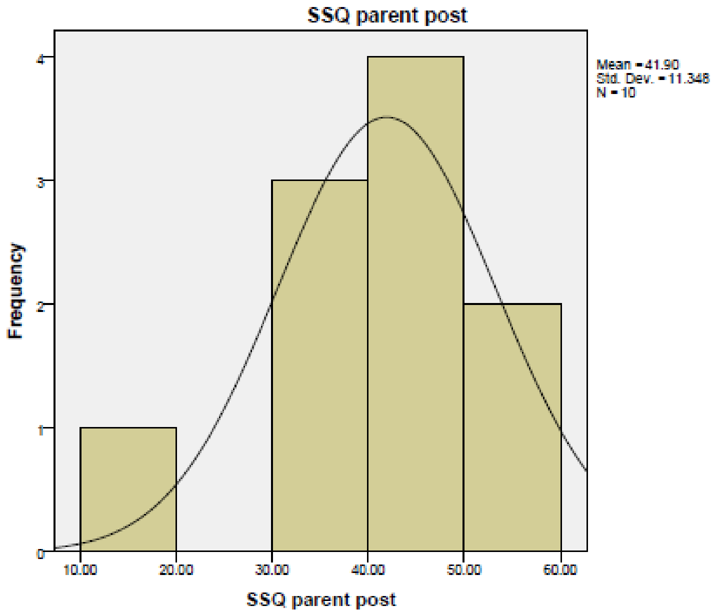
SSQ parent post
Mean = 41.90
Std. Dev. = 11.348
N = 10
Frequency
0
1
2
3
4
10.00
20.00
30.00
40.00
50.00
60.00
SSQ parent post

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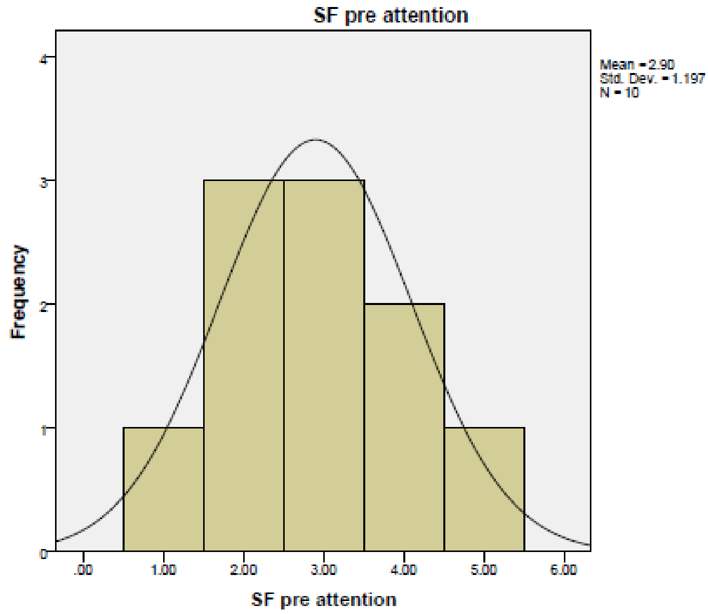
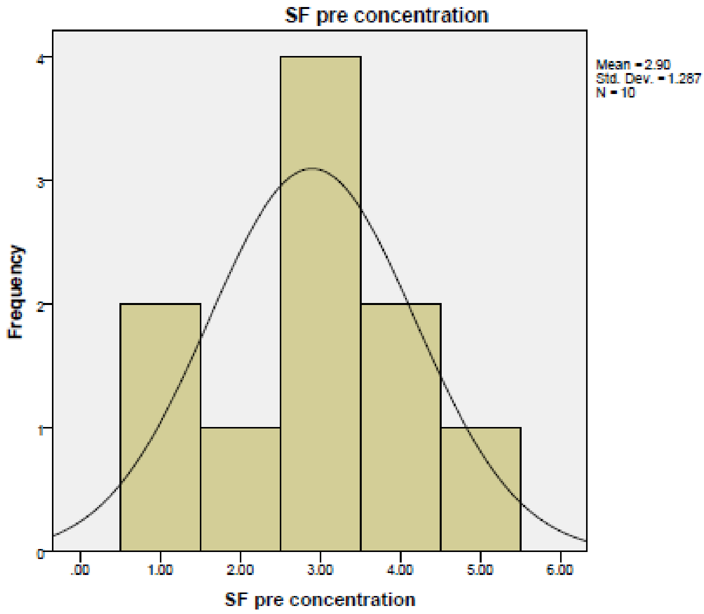

SF pre attention
Mean = 2.90
Std. Dev. = 1.197
N = 10
Frequency
0
1
2
3
4
.00
1.00
2.00
3.00
4.00
5.00
6.00
SF pre attention


SF pre concentration
Mean = 2.90
Std. Dev. = 1.287
N = 10
Frequency
0
1
2
3
4
.00
1.00
2.00
3.00
4.00
5.00
6.00
SF pre concentration

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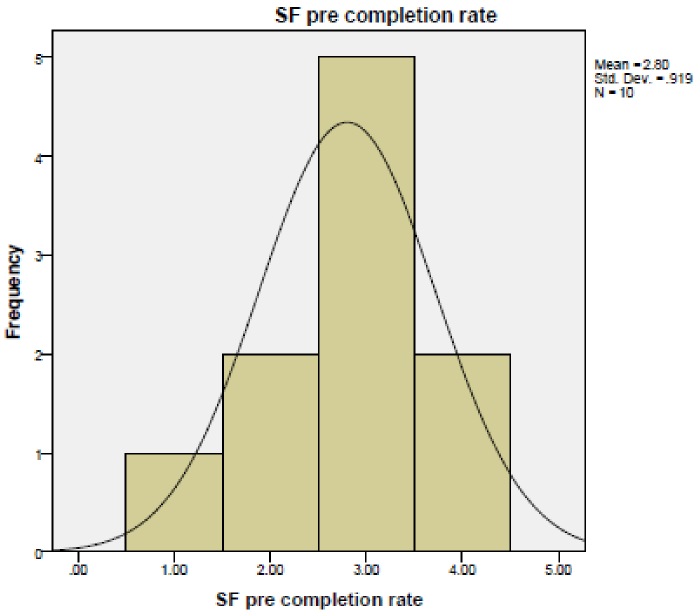
SF pre completion rate
Mean = 2.80
Std. Dev. = .919
N = 10
Frequency
0
1
2
3
4
5
.00
1.00
2.00
3.00
4.00
5.00
SF pre completion rate

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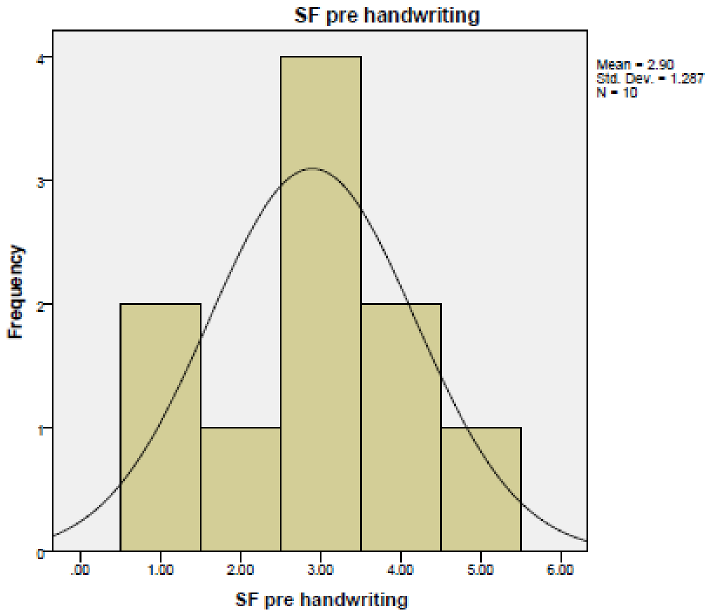
SF pre handwriting
Mean = 2.90
Std. Dev. = 1.287
N = 10
Frequency
0
1
2
3
4
.00
1.00
2.00
3.00
4.00
5.00
6.00
SF pre handwriting

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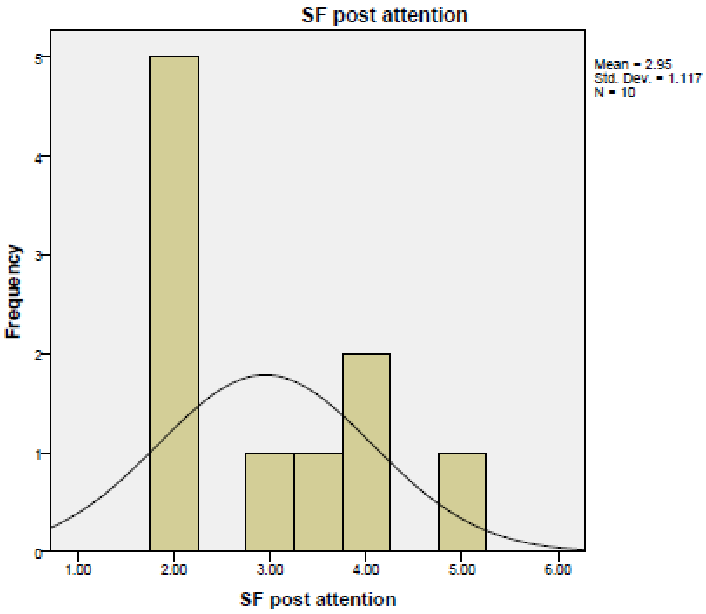
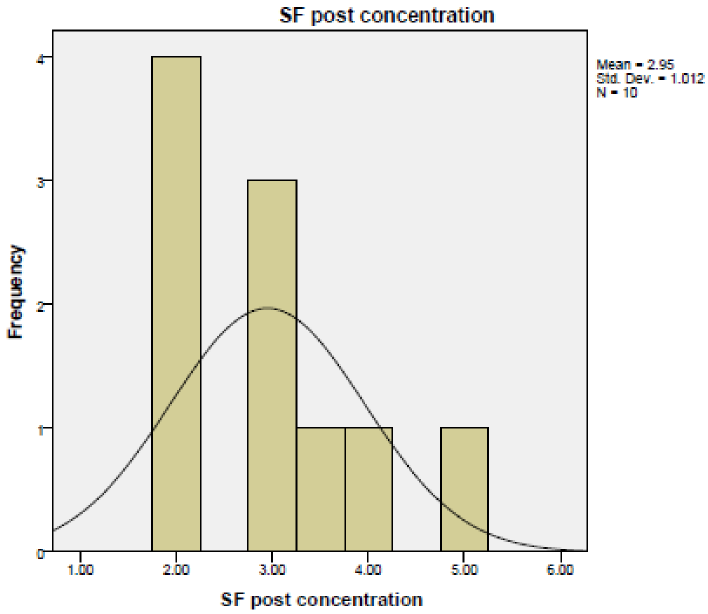

SF post attention
Mean = 2.95
Std. Dev. = 1.117
N = 10
Frequency
0
1
2
3
4
5
1.00
2.00
3.00
4.00
5.00
6.00
SF post attention

Page 65


SF post concentration
Mean = 2.95
Std. Dev. = 1.012
N = 10
Frequency
0
1
2
3
4
1.00
2.00
3.00
4.00
5.00
6.00
SF post concentration

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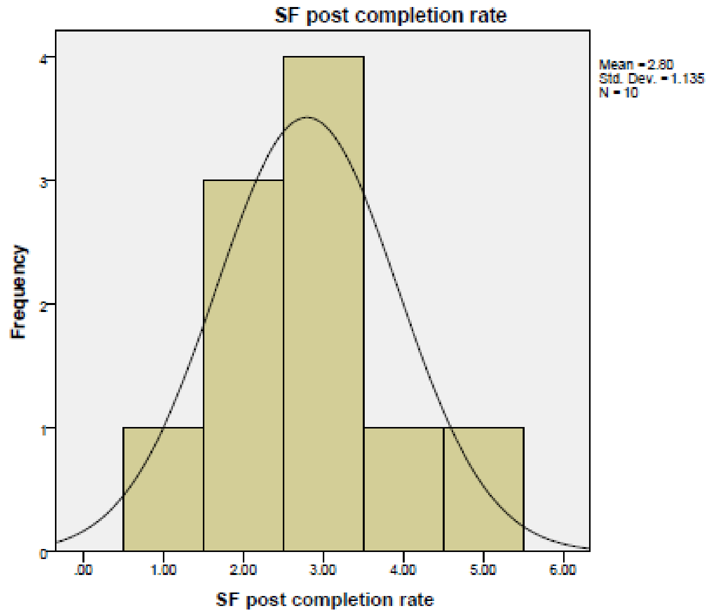
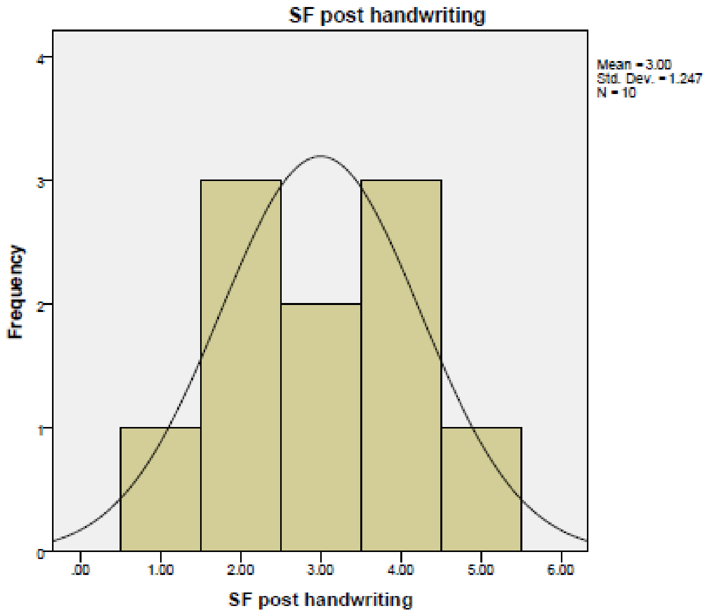

SF post completion rate
Mean = 2.80
Std. Dev. = 1.135
N = 10
Frequency
0
1
2
3
4
.00
1.00
2.00
3.00
4.00
5.00
6.00
SF post completion rate


SF post handwriting
Mean = 3.00
Std. Dev. = 1.247
N = 10
Frequency
0
1
2
3
4
.00
1.00
2.00
3.00
4.00
5.00
6.00
SF post handwriting

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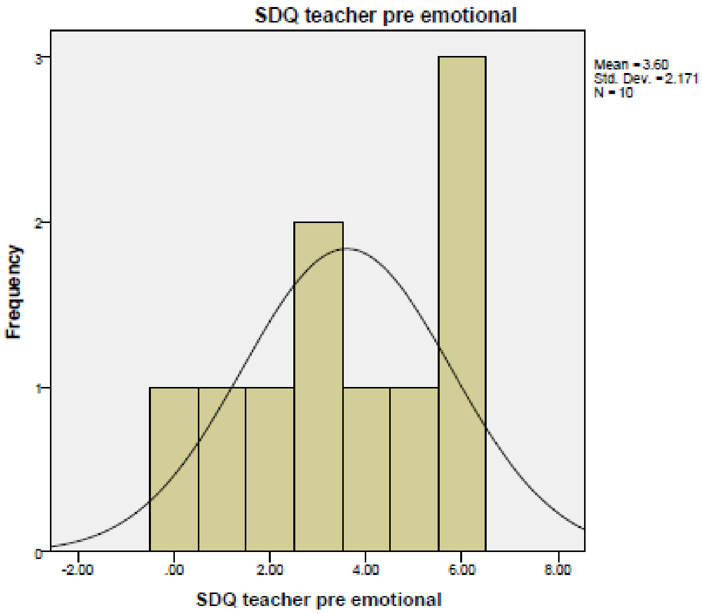
SDQ teacher pre emotional
Mean = 3.60
Std. Dev. = 2.171
N = 10
Frequency
0
1
2
3
-2.00
.00
2.00
4.00
6.00
8.00
SDQ teacher pre emotional

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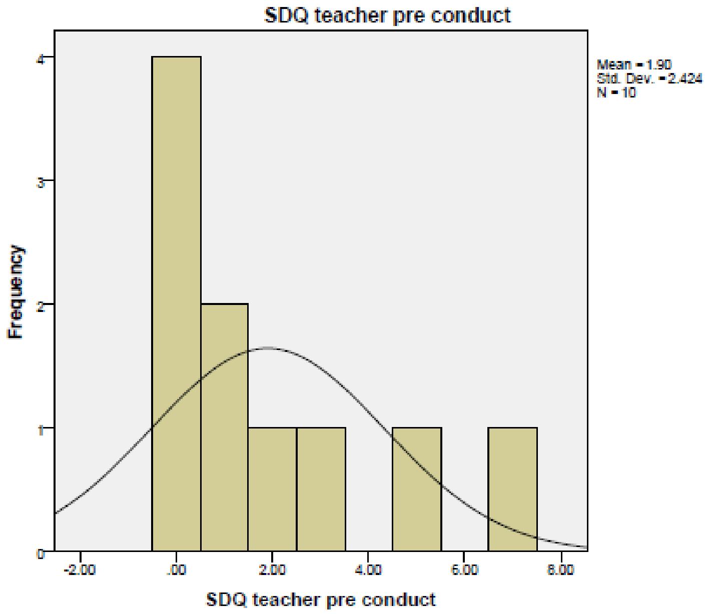
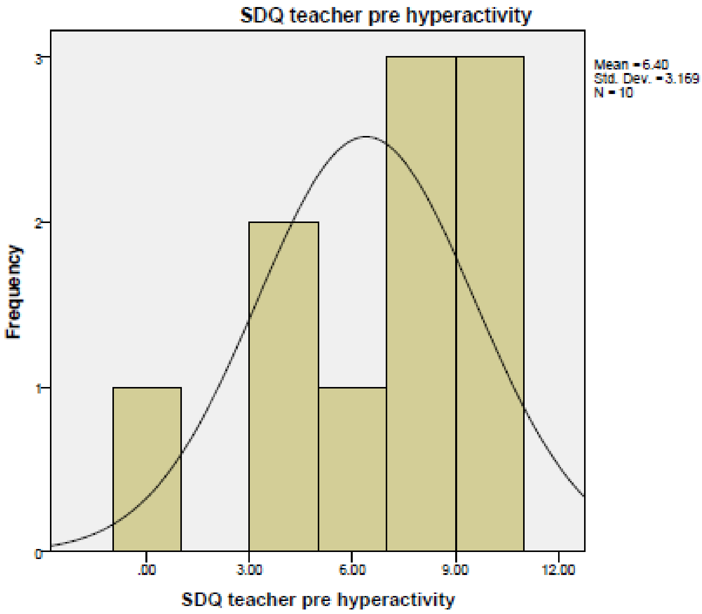

SDQ teacher pre conduct
Mean = 1.90
Std. Dev. = 2.424
N = 10
Frequency
0
1
2
3
4
-2.00
.00
2.00
4.00
6.00
8.00
SDQ teacher pre conduct


SDQ teacher pre hyperactivity
Mean = 6.40
Std. Dev. = 3.169
N = 10
Frequency
0
1
2
3
.00
3.00
6.00
9.00
12.00
SDQ teacher pre hyperactivity

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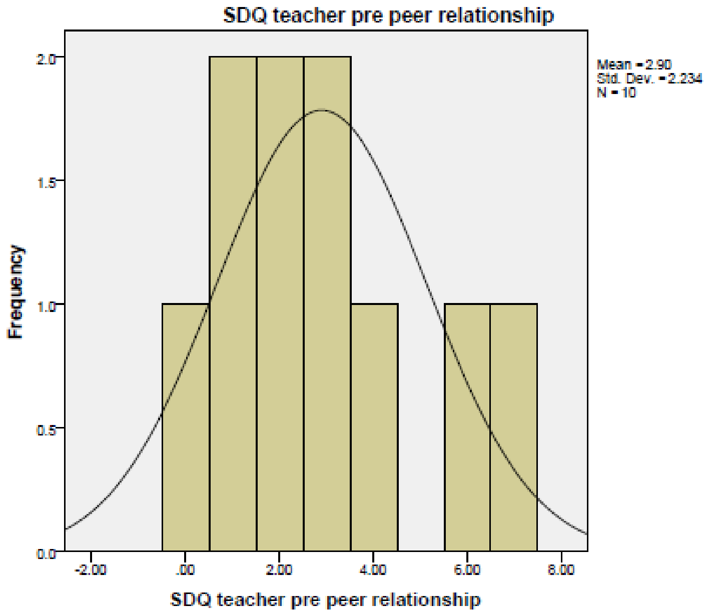
SDQ teacher pre peer relationship
Mean = 2.90
Std. Dev. = 2.234
N = 10
Frequency
0.0
0.5
1.0
1.5
2.0
-2.00
.00
2.00
4.00
6.00
8.00
SDQ teacher pre peer relationship

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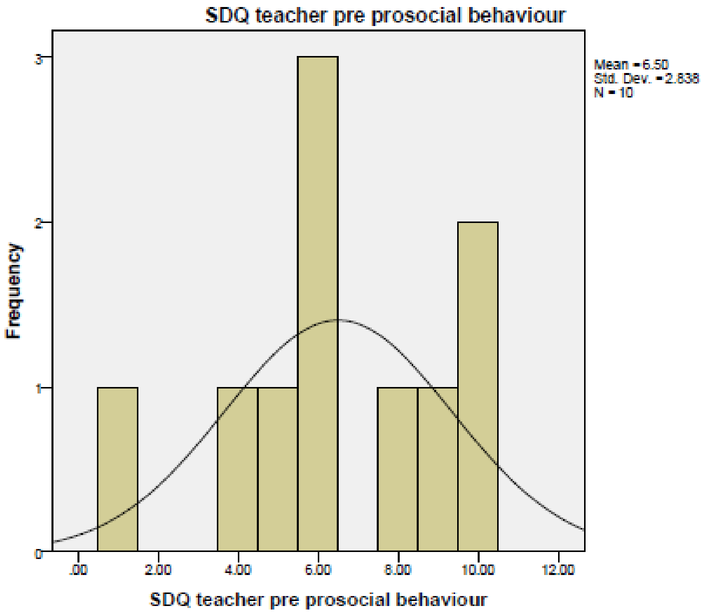
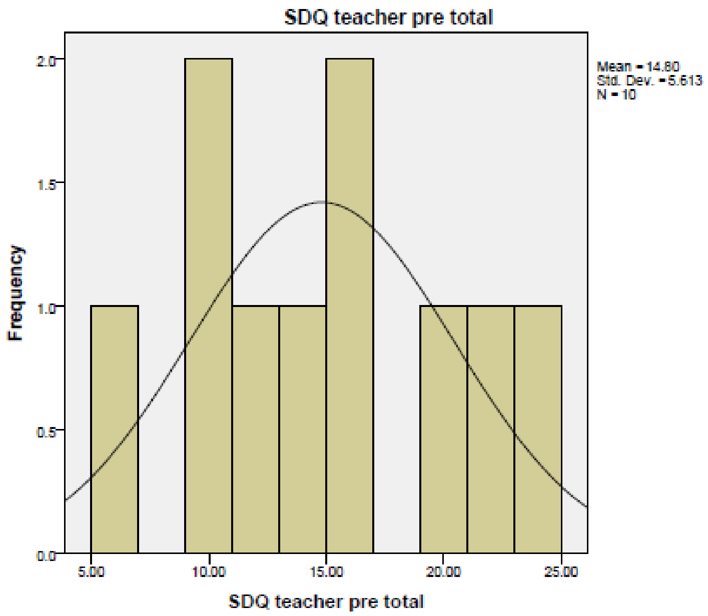

SDQ teacher pre prosocial behaviour
Mean = 6.50
Std. Dev. = 2.838
N = 10
Frequency
0
1
2
3
.00
2.00
4.00
6.00
8.00
10.00
12.00
SDQ teacher pre prosocial behaviour



SDQ teacher pre total
Mean = 14.80
Std. Dev. = 5.613
N = 10
Frequency
2.0
1.5
1.0
0.5
0.0
5.00
10.00
15.00
20.00
25.00
SDQ teacher pre total

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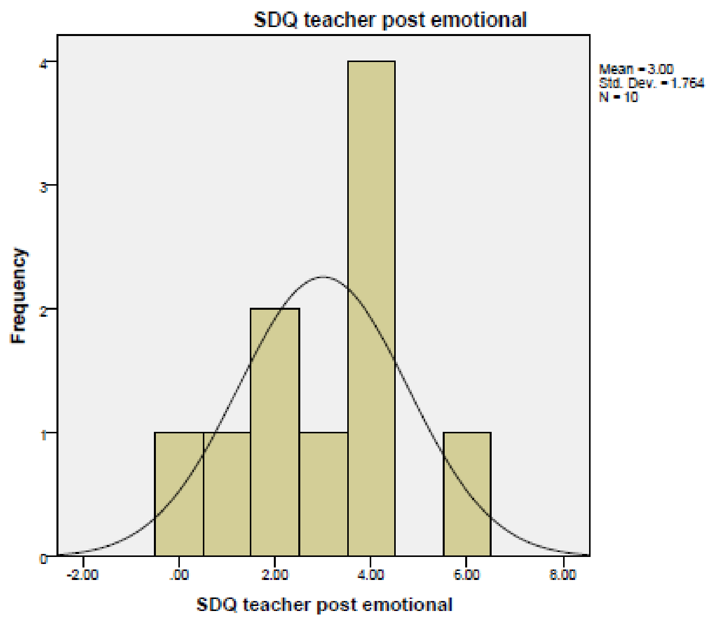
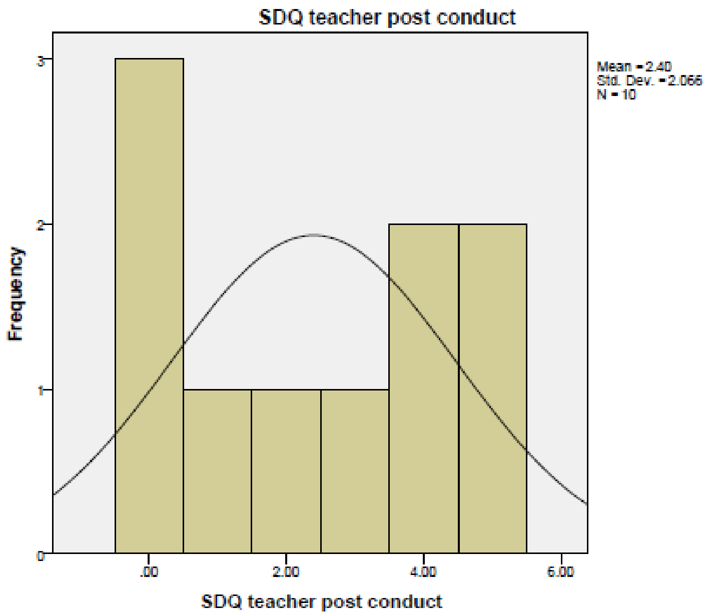


SDQ teacher post emotional
Mean = 3.00
Std. Dev. = 1.764
N = 10
Frequency
4
3
2
1
0
-2.00
.00
2.00
4.00
6.00
8.00
SDQ teacher post emotional


SDQ teacher post conduct
Mean = 2.40
Std. Dev. = 2.066
N = 10
Frequency
0
1
2
3
.00
2.00
4.00
6.00
SDQ teacher post conduct

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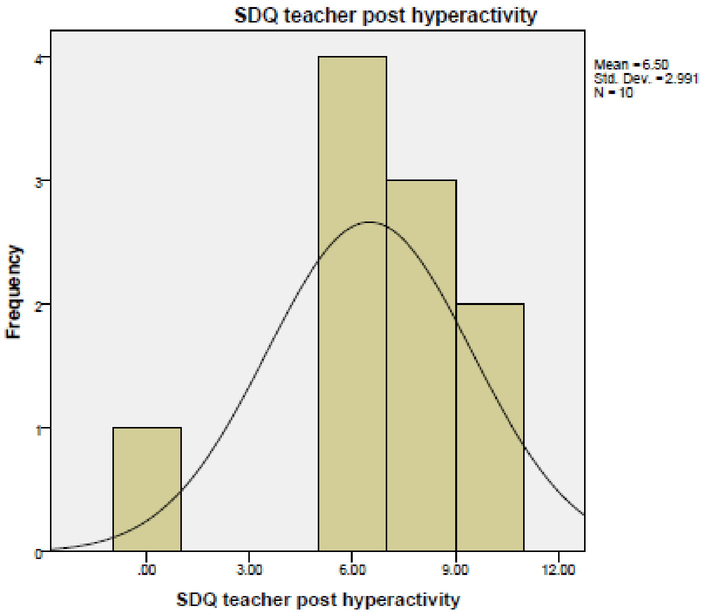
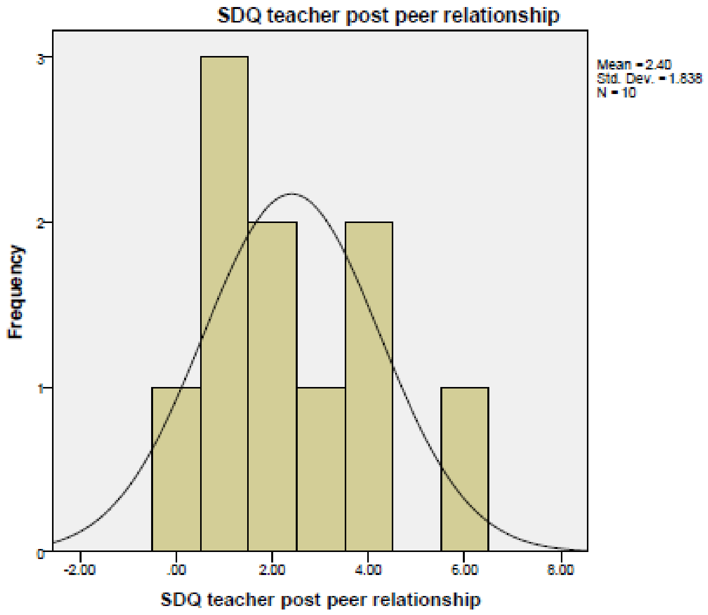

SDQ teacher post hyperactivity
Mean = 6.50
Std. Dev. = 2.991
N = 10
Frequency
0
1
2
3
4
.00
3.00
6.00
9.00
12.00
SDQ teacher post hyperactivity


SDQ teacher post peer relationship
Mean = 2.40
Std. Dev. = 1.838
N = 10
Frequency
0
1
2
3
-2.00
.00
2.00
4.00
6.00
8.00
SDQ teacher post peer relationship

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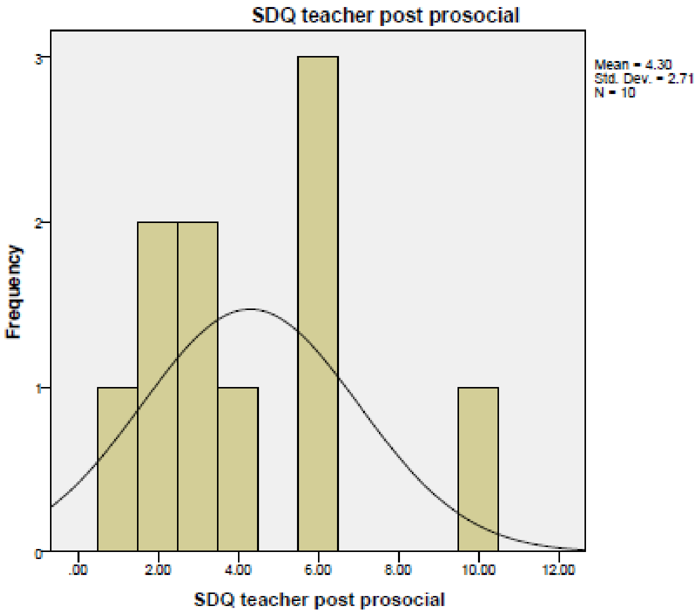
SDQ teacher post prosocial
Mean = 4.30
Std. Dev. = 2.71
N = 10
Frequency
0
1
2
3
.00
2.00
4.00
6.00
8.00
10.00
12.00
SDQ teacher post prosocial

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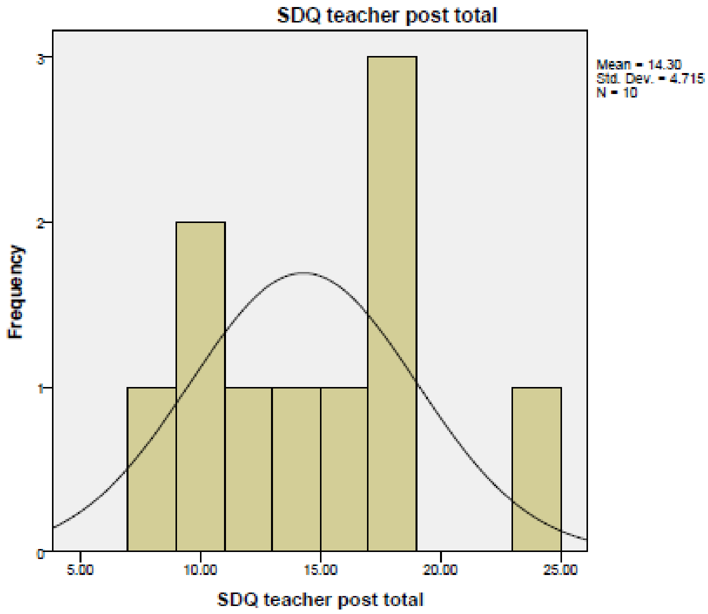
SDQ teacher post total
Mean = 14.30
Std. Dev. = 4.715
N = 10
Frequency
0
1
2
3
5.00
10.00
15.00
20.00
25.00
SDQ teacher post total

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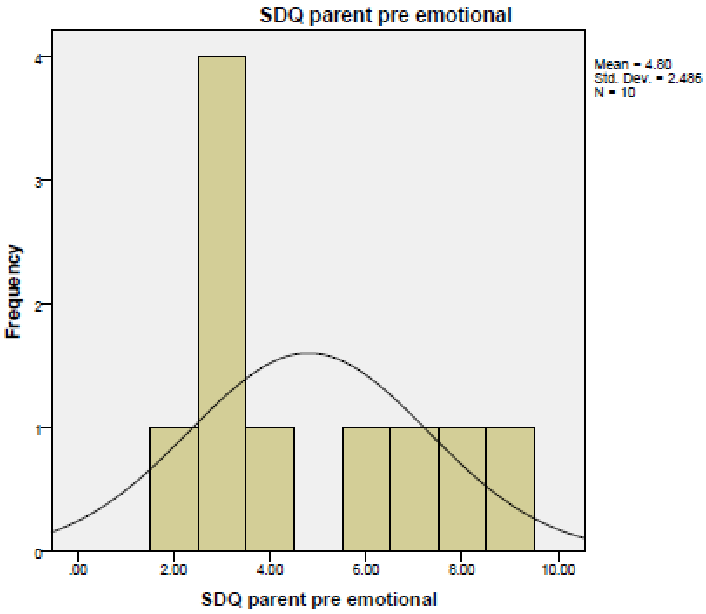
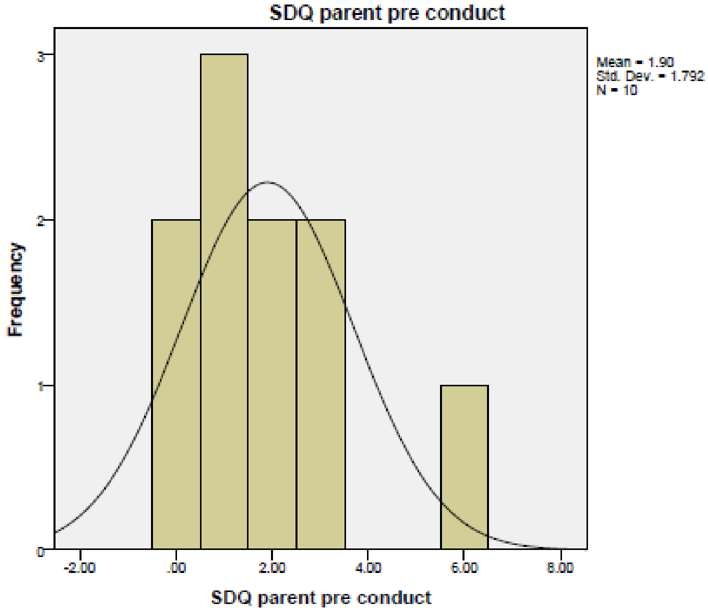
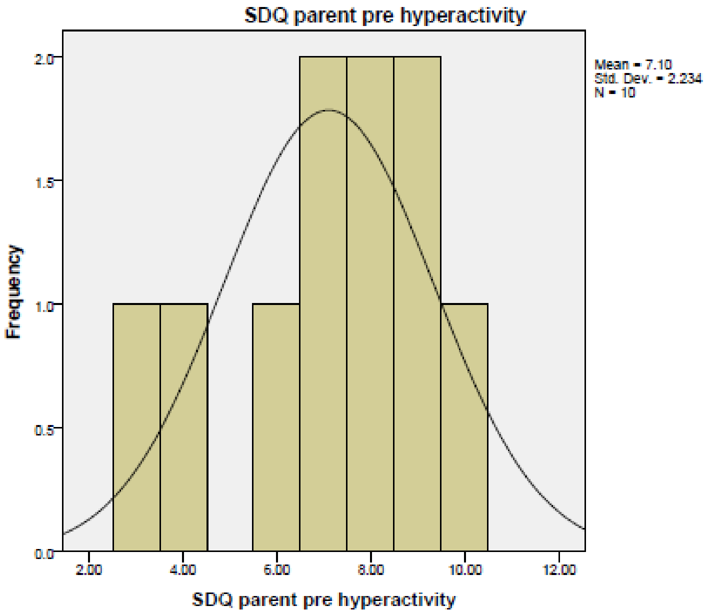

SDQ parent pre emotional
Mean = 4.80
Std. Dev. = 2.486
N = 10
Frequency
0
1
2
3
4
.00
2.00
4.00
6.00
8.00
10.00
SDQ parent pre emotional

SDQ parent pre conduct




SDQ parent pre hyperactivity
Frequency
2.0
1.5
1.0
0.5
0.0
2.00
4.00
6.00
8.00
10.00
12.00
SDQ parent pre hyperactivity
Mean = 7.10
Std. Dev. = 2.234
N = 10

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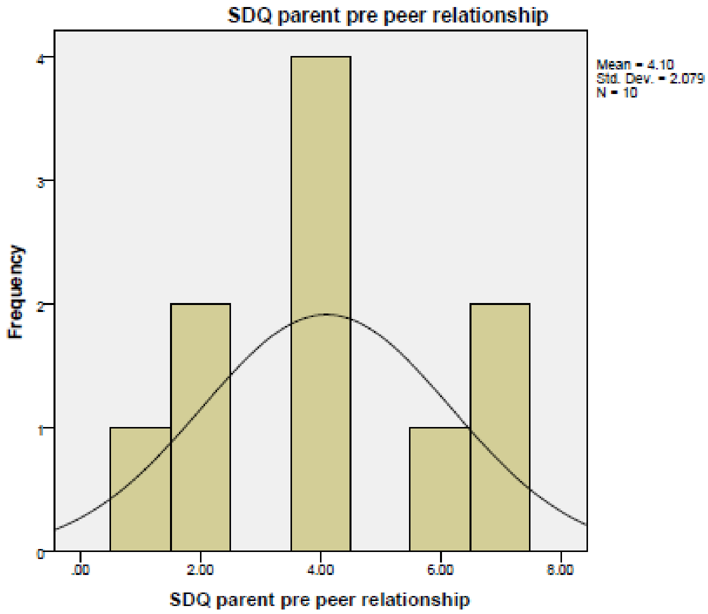
SDQ parent pre peer relationship
Mean = 4.10
Std. Dev. = 2.079
N = 10
Frequency
0
1
2
3
4
.00
2.00
4.00
6.00
8.00
SDQ parent pre peer relationship

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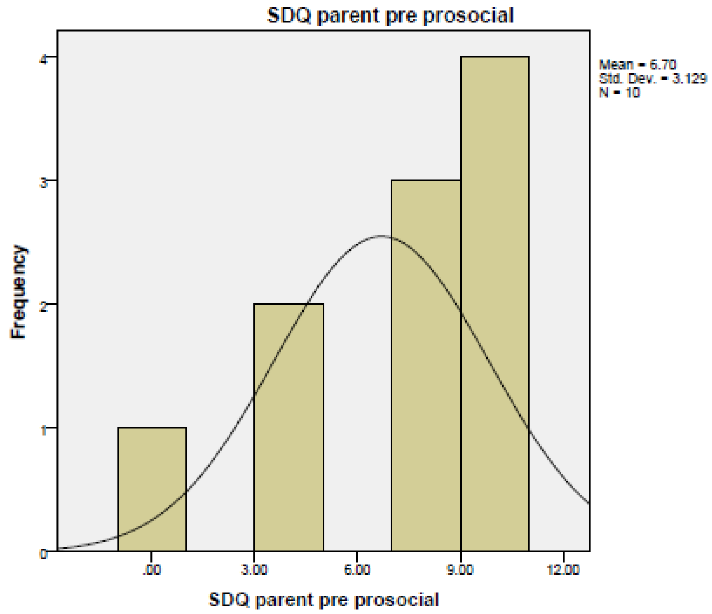
SDQ parent pre prosocial
Frequency
0
1
2
3
4
.00
3.00
6.00
9.00
12.00
SDQ parent pre prosocial
Mean = 6.70
Std. Dev. = 3.129
N = 10

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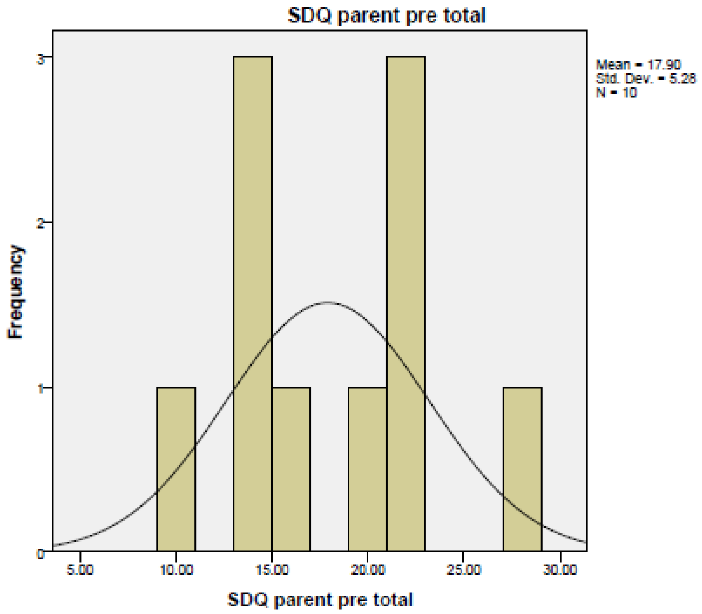
SDQ parent pre total
Mean = 17.90
Std. Dev. = 5.28
N = 10
Frequency
0
1
2
3
5.00
10.00
15.00
20.00
25.00
30.00
SDQ parent pre total

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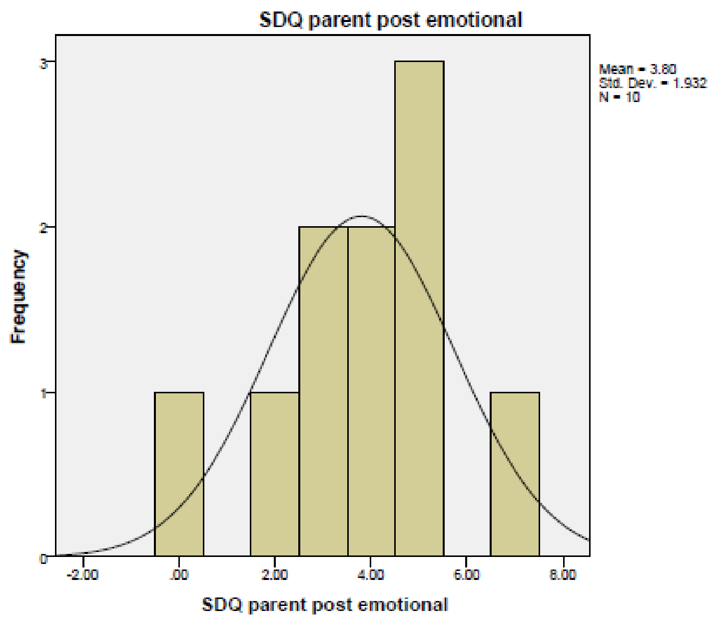
SDQ parent post emotional
Mean = 3.80
Std. Dev. = 1.932
N = 10
Frequency
0
1
2
3
-2.00
.00
2.00
4.00
6.00
8.00
SDQ parent post emotional

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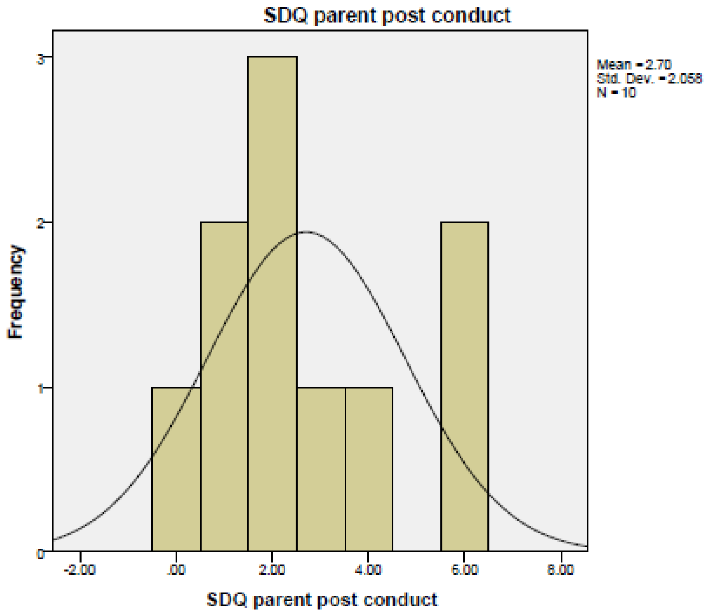
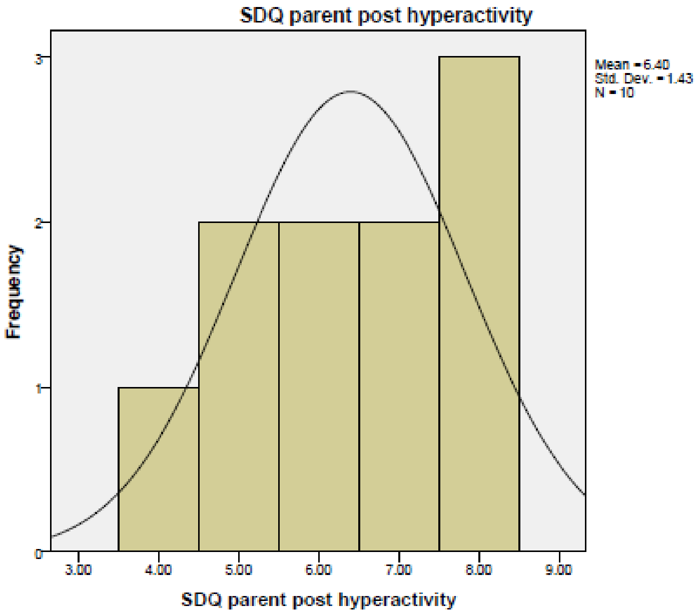

SDQ parent post conduct
Mean = 2.70
Std. Dev. = 2.058
N = 10
Frequency
0
1
2
3
-2.00
.00
2.00
4.00
6.00
8.00
SDQ parent post conduct


SDQ parent post hyperactivity
Mean = 6.40
Std. Dev. = 1.43
N = 10
Frequency
0
1
2
3
3.00
4.00
5.00
6.00
7.00
8.00
9.00
SDQ parent post hyperactivity

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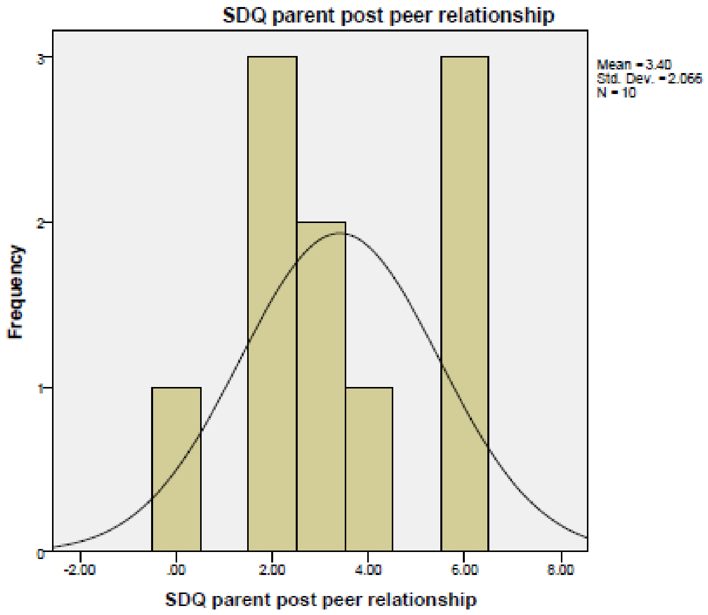
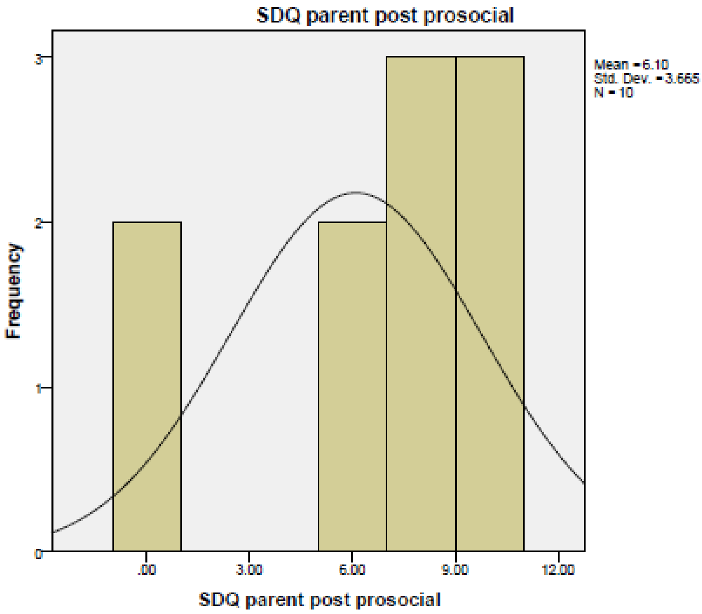

SDQ parent post peer relationship
Mean = 3.40
Std. Dev. = 2.066
N = 10
Frequency
3
2
1
0
-2.00
.00
2.00
4.00
6.00
8.00
SDQ parent post peer relationship


SDQ parent post prosocial
Frequency
Mean = 6.10
Std. Dev. = 3.665
N = 10
0
1
2
3
.00
3.00
6.00
9.00
12.00
SDQ parent post prosocial

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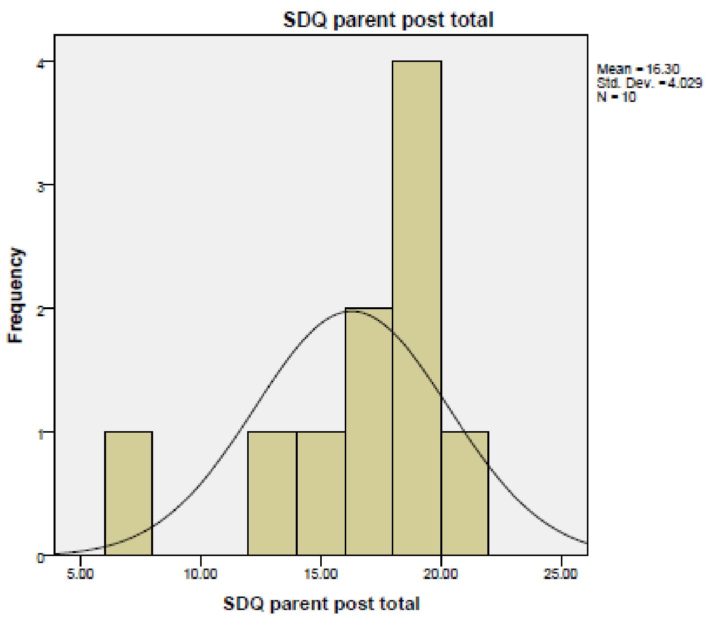
SDQ parent post total
Mean = 16.30
Std. Dev. = 4.029
N = 10
Frequency
0
1
2
3
4
5.00
10.00
15.00
20.00
25.00
SDQ parent post total

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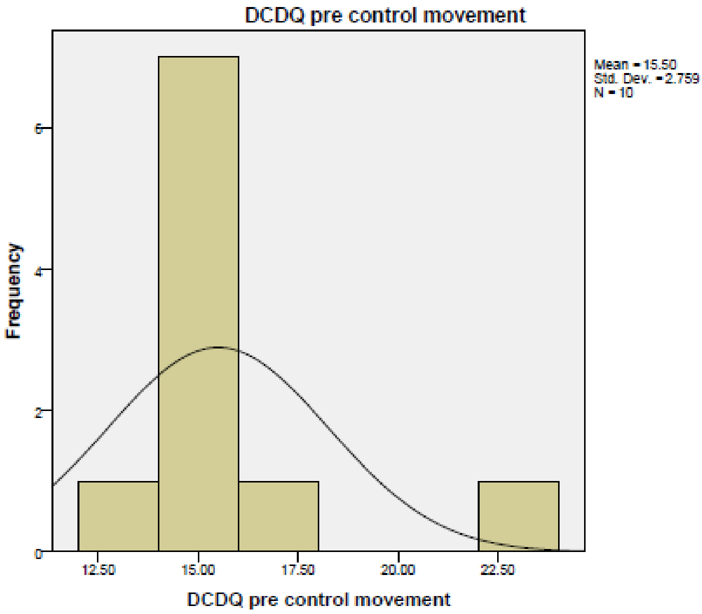
DCDQ pre control movement
Mean = 15.50
Std. Dev. = 2.759
N = 10
Frequency
0
2
4
6
12.50
15.00
17.50
20.00
22.50
DCDQ pre control movement

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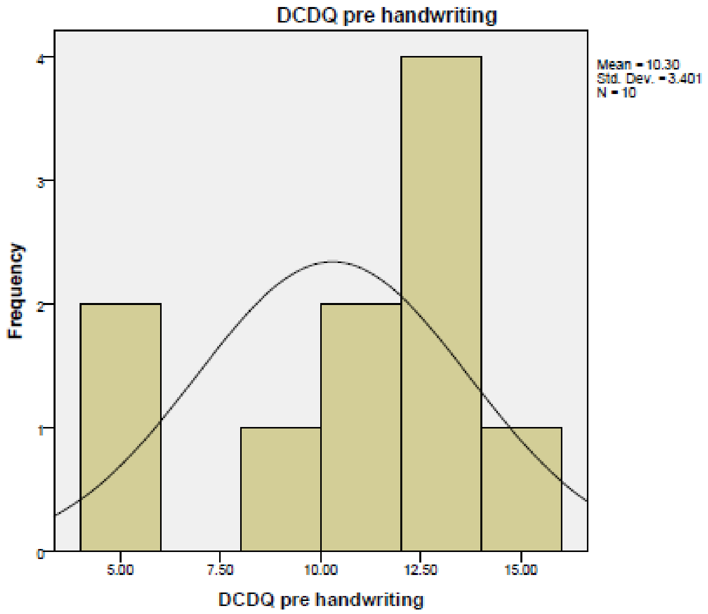
DCDQ pre handwriting
Mean = 10.30
Std. Dev. = 3.401
N = 10
Frequency
0
1
2
3
4
5.00
7.50
10.00
12.50
15.00
DCDQ pre handwriting

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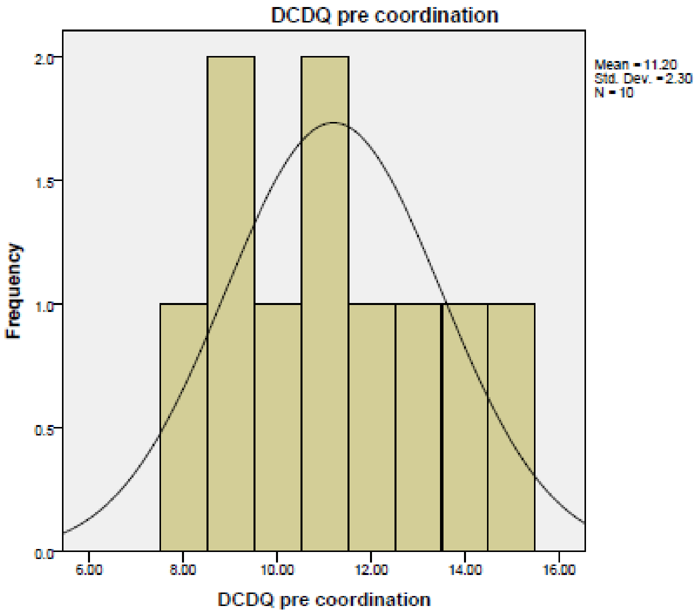
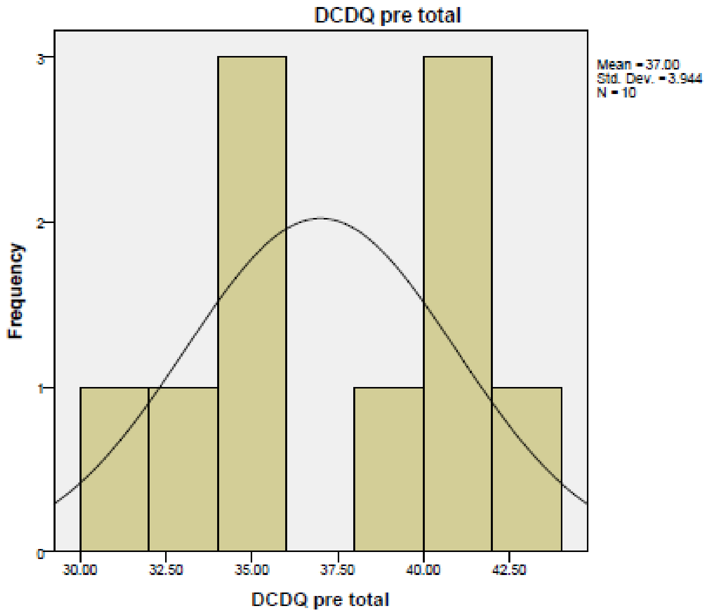

DCDQ pre coordination
Mean = 11.20
Std. Dev. = 2.30
N = 10
Frequency
0.0
0.5
1.0
1.5
2.0
6.00
8.00
10.00
12.00
14.00
16.00
DCDQ pre coordination



DCDQ pre total
Mean = 37.00
Std. Dev. = 3.944
N = 10
Frequency
0
1
2
3
30.00
32.50
35.00
37.50
40.00
42.50
DCDQ pre total

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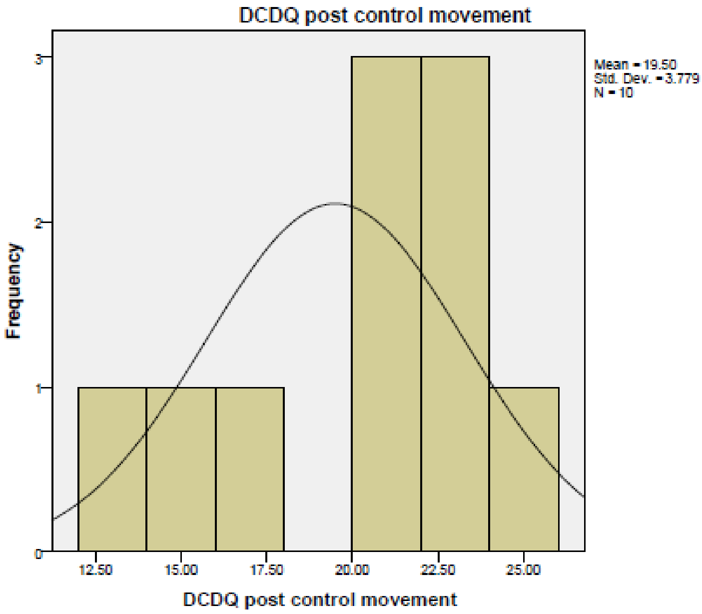
DCDQ post control movement
Mean = 19.50
Std. Dev. = 3.779
N = 10
Frequency
0
1
2
3
12.50
15.00
17.50
20.00
22.50
25.00
DCDQ post control movement

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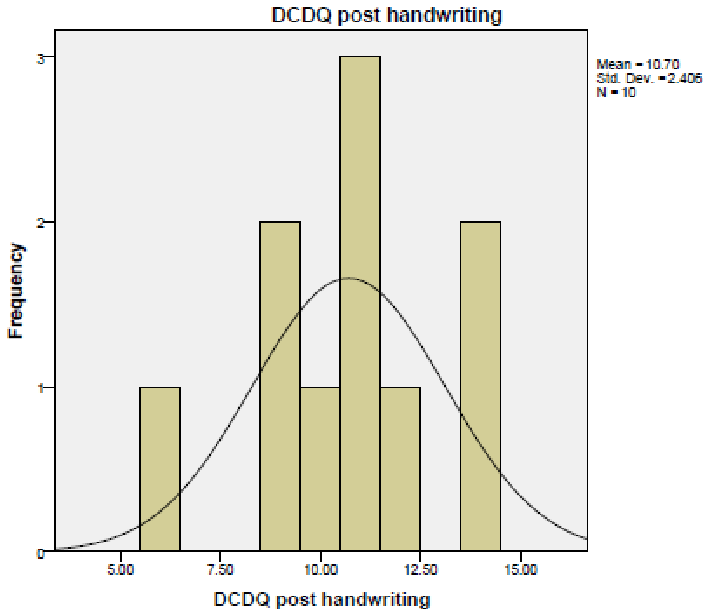
DCDQ post handwriting
Mean = 10.70
Std. Dev. = 2.406
N = 10
Frequency
0
1
2
3
5.00
7.50
10.00
12.50
15.00
DCDQ post handwriting

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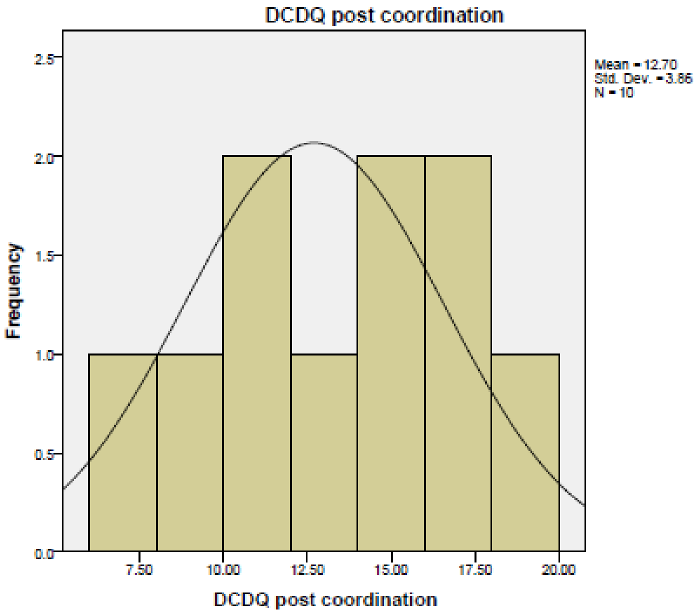
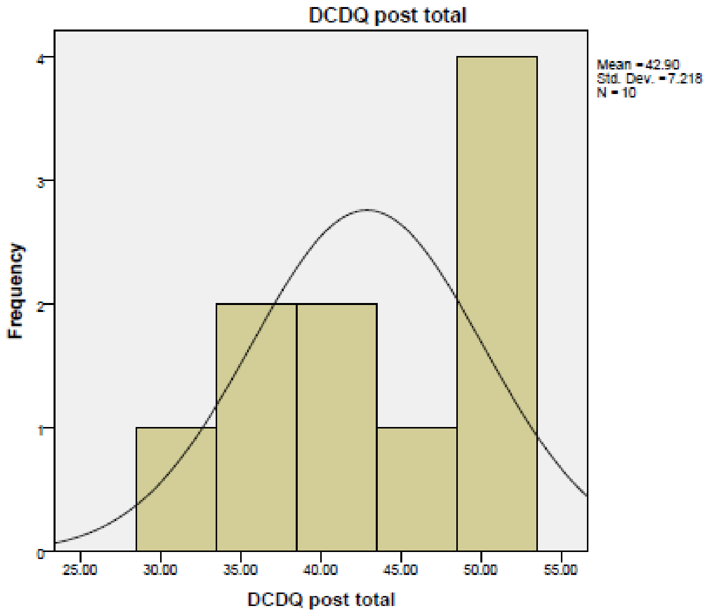

DCDQ post coordination
Mean = 12.70
Std. Dev. = 3.86
N = 10
Frequency
2.5
2.0
1.5
1.0
0.5
0.0
7.50
10.00
12.50
15.00
17.50
20.00
DCDQ post coordination

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SDQteaPREcon SDQteaPREhyp SDQteaPREpeer SDQteaPREpro SDQteaPREtot SDQteaPOSTem SDQteaPOSTcon
  /PLOT NPPLOT
  /STATISTICS DESCRIPTIVES EXTREME
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
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Explore

Notes

Output Created		29-JUN-2014 16:43:27
Comments		
Input	Data	C:\Users\Melanie Morgan Jones\Documents\ABC Doctorate Documents\PHASE 3\Thesis\data analysis\Thesis data.sav
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	Filter	<none>
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	Split File	<none>
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	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.
Syntax		EXAMINE VARIABLES=AGE SCQ MpreMD MpreAC MpreB MpreTOT MpostMD MpostAC MpostB MpostTOT SPPpuPREsch SPPpuPREsoc SPPpuPREac SPPpuPREpa SPPpuPREbc SPPpuPREgsw SPPpuPOSTsch SPPpuPOSTsoc SPPpuPOSTac SPPpuPOSTpa SPPpuPOSTbc SPPpuPOSTgsw SPPparPREsch SPPparPREsoc SPPparPREac SPPparPREpa SPPparPREbc SPPparPOSTsch SPPparPOSTsoc SPPparPOSTac SPPparPOSTpa SPPparPOSTbc SSQpuPRE SSQpuPOST SSQteaPRE SSQteaPOST SSQparPRE SSQparPOST SFpreATT SFpreCON SFpreCOMP SFpreHAND SFpostATT SFpostCON SFpostCOMP SFpostHAND SDQteaPREem SDQteaPREcon SDQteaPREhyp SDQteaPREpeer SDQteaPREpro SDQteaPREtot SDQteaPOSTem SDQteaPOSTcon SDQteaPOSThyp SDQteaPOSTpeer SDQteaPOSTpro SDQteaPOSTtot SDQparPREem ...
Resources	Processor Time	00:00:21.02
	Elapsed Time	00:00:21.22

[DataSet0] C:\Users\Melanie Morgan Jones\Documents\ABC Doctorate Documents \PHASE 3\Thesis\data analysis\Thesis data.sav

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Age in months	10	100.0%	0	0.0%	10	100.0%
Social Communication Questionnaire	10	100.0%	0	0.0%	10	100.0%
MABC2pre manual dexterity	10	100.0%	0	0.0%	10	100.0%
MABC2pre aiming and catching	10	100.0%	0	0.0%	10	100.0%
MABC2pre balance	10	100.0%	0	0.0%	10	100.0%
MABC2pre total	10	100.0%	0	0.0%	10	100.0%
MABC2post manual dexterity	10	100.0%	0	0.0%	10	100.0%
MABC2post aiming and catching	10	100.0%	0	0.0%	10	100.0%
MABC2post balance	10	100.0%	0	0.0%	10	100.0%
MABC2post total	10	100.0%	0	0.0%	10	100.0%
SPP pupil pre scholastic competence	10	100.0%	0	0.0%	10	100.0%
SPP pupil pre social competence	10	100.0%	0	0.0%	10	100.0%
SPP pupil pre athletic competence	10	100.0%	0	0.0%	10	100.0%
SPP pupil pre physical apprearance	10	100.0%	0	0.0%	10	100.0%
SPP pupil pre behavioural conduct	10	100.0%	0	0.0%	10	100.0%
SPP pupil pre global self worth	10	100.0%	0	0.0%	10	100.0%
SPP pupil post scholastic competence	10	100.0%	0	0.0%	10	100.0%
SPP pupil post social competence	10	100.0%	0	0.0%	10	100.0%
SPP pupil post athletic competence	10	100.0%	0	0.0%	10	100.0%
SPP pupil post physical appearance	10	100.0%	0	0.0%	10	100.0%
SPP pupil post behavioural conduct	10	100.0%	0	0.0%	10	100.0%
SPP pupil post global self worth	10	100.0%	0	0.0%	10	100.0%
SPP parent pre scholastic competence	10	100.0%	0	0.0%	10	100.0%
SPP parent pre social competence	10	100.0%	0	0.0%	10	100.0%

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SPP parent pre athletic competence	10	100.0%	0	0.0%	10	100.0%
SPP parent pre physical appreance	10	100.0%	0	0.0%	10	100.0%
SPP parent pre behavioural conduct	10	100.0%	0	0.0%	10	100.0%
SPP parent post scholastic competence	10	100.0%	0	0.0%	10	100.0%
SPP parent post social acceptance	10	100.0%	0	0.0%	10	100.0%
SPP parent post athletic competence	10	100.0%	0	0.0%	10	100.0%
SPP parent post physical apprearance	10	100.0%	0	0.0%	10	100.0%
SPP parent post behavioural conduct	10	100.0%	0	0.0%	10	100.0%
SSQ pupil pre	10	100.0%	0	0.0%	10	100.0%
SSQ pupil post	10	100.0%	0	0.0%	10	100.0%
SSQ teacher pre	10	100.0%	0	0.0%	10	100.0%
SSQ teacher post	10	100.0%	0	0.0%	10	100.0%
SSQ parent pre	10	100.0%	0	0.0%	10	100.0%
SSQ parent post	10	100.0%	0	0.0%	10	100.0%
SF pre attention	10	100.0%	0	0.0%	10	100.0%
SF pre concentration	10	100.0%	0	0.0%	10	100.0%
SF pre completion rate	10	100.0%	0	0.0%	10	100.0%
SF pre handwriting	10	100.0%	0	0.0%	10	100.0%
SF post attention	10	100.0%	0	0.0%	10	100.0%
SF post concentration	10	100.0%	0	0.0%	10	100.0%
SF post completion rate	10	100.0%	0	0.0%	10	100.0%
SF post handwriting	10	100.0%	0	0.0%	10	100.0%
SDQ teacher pre emotional	10	100.0%	0	0.0%	10	100.0%
SDQ teacher pre conduct	10	100.0%	0	0.0%	10	100.0%
SDQ teacher pre hyperactivity	10	100.0%	0	0.0%	10	100.0%
SDQ teacher pre peer relationship	10	100.0%	0	0.0%	10	100.0%
SDQ teacher pre prosocial behaviour	10	100.0%	0	0.0%	10	100.0%
SDQ teacher pre total	10	100.0%	0	0.0%	10	100.0%
SDQ teacher post emotional	10	100.0%	0	0.0%	10	100.0%

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SDQ teacher post conduct	10	100.0%	0	0.0%	10	100.0%
SDQ teacher post hyperactivity	10	100.0%	0	0.0%	10	100.0%
SDQ teacher post peer relationship	10	100.0%	0	0.0%	10	100.0%
SDQ teacher post prosocial	10	100.0%	0	0.0%	10	100.0%
SDQ teacher post total	10	100.0%	0	0.0%	10	100.0%
SDQ parent pre emotional	10	100.0%	0	0.0%	10	100.0%
SDQ parent pre conduct	10	100.0%	0	0.0%	10	100.0%
SDQ parent pre hyperactivity	10	100.0%	0	0.0%	10	100.0%
SDQ parent pre peer relationship	10	100.0%	0	0.0%	10	100.0%
SDQ parent pre prosocial	10	100.0%	0	0.0%	10	100.0%
SDQ parent pre total	10	100.0%	0	0.0%	10	100.0%
SDQ parent post emotional	10	100.0%	0	0.0%	10	100.0%
SDQ parent post conduct	10	100.0%	0	0.0%	10	100.0%
SDQ parent post hyperactivity	10	100.0%	0	0.0%	10	100.0%
SDQ parent post peer relationship	10	100.0%	0	0.0%	10	100.0%
SDQ parent post prosocial	10	100.0%	0	0.0%	10	100.0%
SDQ parent post total	10	100.0%	0	0.0%	10	100.0%
DCDQ pre control movement	10	100.0%	0	0.0%	10	100.0%
DCDQ pre handwriting	10	100.0%	0	0.0%	10	100.0%
DCDQ pre coordination	10	100.0%	0	0.0%	10	100.0%
DCDQ pre total	10	100.0%	0	0.0%	10	100.0%
DCDQ post control movement	10	100.0%	0	0.0%	10	100.0%
DCDQ post handwriting	10	100.0%	0	0.0%	10	100.0%
DCDQ post coordination	10	100.0%	0	0.0%	10	100.0%
DCDQ post total	10	100.0%	0	0.0%	10	100.0%

Descriptives

			Statistic	Std. Error
Age in months	Mean		116.20	4.816
	95% Confidence Interval for Mean	Lower Bound	105.31	
		Upper Bound	127.09	
	5% Trimmed Mean		115.83	
	Median		114.00	
	Variance		231.956	
	Std. Deviation		15.230	
	Minimum		99	
	Maximum		140	
	Range		41	
	Interquartile Range		30	
	Skewness		.511	.687
	Kurtosis		-1.299	1.334
Social Communication Questionnaire	Mean		13.6000	1.51438
	95% Confidence Interval for Mean	Lower Bound	10.1742	
		Upper Bound	17.0258	
	5% Trimmed Mean		13.5556	
	Median		13.5000	
	Variance		22.933	
	Std. Deviation		4.78888	
	Minimum		6.00	
	Maximum		22.00	
	Range		16.00	
	Interquartile Range		6.50	
	Skewness		-.017	.687
	Kurtosis		.113	1.334
MABC2pre manual dexterity	Mean		4.1500	1.01667
	95% Confidence Interval for Mean	Lower Bound	1.8501	
		Upper Bound	6.4499	
	5% Trimmed Mean		4.0833	
	Median		5.0000	
	Variance		10.336	
	Std. Deviation		3.21498	
	Minimum		.50	
	Maximum		9.00	
	Range		8.50	
	Interquartile Range		5.00	
	Skewness		.369	.687
	Kurtosis		-1.108	1.334
MABC2pre aiming and catching	Mean		11.4000	3.78653
	95% Confidence Interval for Mean	Lower Bound	2.8343	
		Upper Bound	19.9657	
	5% Trimmed Mean		10.5556	

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Descriptives

			Statistic	Std. Error
	Median		5.0000	
	Variance		143.378	
	Std. Deviation		11.97405	
	Minimum		1.00	
	Maximum		37.00	
	Range		36.00	
	Interquartile Range		16.25	
	Skewness		1.288	.687
	Kurtosis		.937	1.334
MABC2pre balance	Mean		23.0000	6.78561
	95% Confidence Interval for Mean	Lower Bound	7.6499	
		Upper Bound	38.3501	
	5% Trimmed Mean		22.0000	
	Median		20.5000	
	Variance		460.444	
	Std. Deviation		21.45797	
	Minimum		1.00	
	Maximum		63.00	
	Range		62.00	
	Interquartile Range		38.25	
	Skewness		.762	.687
	Kurtosis		-.434	1.334
MABC2pre total	Mean		4.6000	1.11505
	95% Confidence Interval for Mean	Lower Bound	2.0776	
		Upper Bound	7.1224	
	5% Trimmed Mean		4.5833	
	Median		5.0000	
	Variance		12.433	
	Std. Deviation		3.52609	
	Minimum		.50	
	Maximum		9.00	
	Range		8.50	
	Interquartile Range		8.13	
	Skewness		.170	.687
	Kurtosis		-1.652	1.334
MABC2post manual dexterity	Mean		15.0000	4.74459
	95% Confidence Interval for Mean	Lower Bound	4.2670	
		Upper Bound	25.7330	
	5% Trimmed Mean		13.8333	
	Median		9.0000	
	Variance		225.111	
	Std. Deviation		15.00370	
	Minimum		1.00	

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Descriptives

			Statistic	Std. Error
	Maximum		50.00	
	Range		49.00	
	Interquartile Range		21.00	
	Skewness		1.552	.687
	Kurtosis		2.601	1.334
MABC2post aiming and catching	Mean		26.8500	7.01350
	95% Confidence Interval for Mean	Lower Bound	10.9844	
		Upper Bound	42.7156	
	5% Trimmed Mean		25.6389	
	Median		25.0000	
	Variance		491.892	
	Std. Deviation		22.17863	
	Minimum		.50	
	Maximum		75.00	
	Range		74.50	
	Interquartile Range		32.75	
	Skewness		.900	.687
	Kurtosis		1.522	1.334
MABC2post balance	Mean		55.1000	10.07246
	95% Confidence Interval for Mean	Lower Bound	32.3145	
		Upper Bound	77.8855	
	5% Trimmed Mean		55.2778	
	Median		50.0000	
	Variance		1014.544	
	Std. Deviation		31.85191	
	Minimum		9.00	
	Maximum		98.00	
	Range		89.00	
	Interquartile Range		66.00	
	Skewness		.089	.687
	Kurtosis		-1.555	1.334
MABC2post total	Mean		23.5000	6.29506
	95% Confidence Interval for Mean	Lower Bound	9.2596	
		Upper Bound	37.7404	
	5% Trimmed Mean		22.5556	
	Median		20.5000	
	Variance		396.278	
	Std. Deviation		19.90673	
	Minimum		1.00	
	Maximum		63.00	
	Range		62.00	
	Interquartile Range		32.00	
	Skewness		.730	.687

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Descriptives

			Statistic	Std. Error
	Kurtosis		-.070	1.334
SPP pupil pre scholastic competence	Mean		2.3300	.20388
	95% Confidence Interval for Mean	Lower Bound	1.8688	
		Upper Bound	2.7912	
	5% Trimmed Mean		2.3222	
	Median		2.4000	
	Variance		.416	
	Std. Deviation		.64472	
	Minimum		1.30	
	Maximum		3.50	
	Range		2.20	
	Interquartile Range		.95	
	Skewness		.147	.687
	Kurtosis		-.127	1.334
SPP pupil pre social competence	Mean		2.7100	.16829
	95% Confidence Interval for Mean	Lower Bound	2.3293	
		Upper Bound	3.0907	
	5% Trimmed Mean		2.7167	
	Median		2.8000	
	Variance		.283	
	Std. Deviation		.53219	
	Minimum		1.80	
	Maximum		3.50	
	Range		1.70	
	Interquartile Range		.88	
	Skewness		-.258	.687
	Kurtosis		-.672	1.334
SPP pupil pre athletic competence	Mean		2.1600	.23674
	95% Confidence Interval for Mean	Lower Bound	1.6245	
		Upper Bound	2.6955	
	5% Trimmed Mean		2.1222	
	Median		2.0000	
	Variance		.560	
	Std. Deviation		.74863	
	Minimum		1.30	
	Maximum		3.70	
	Range		2.40	
	Interquartile Range		1.13	
	Skewness		.865	.687
	Kurtosis		.560	1.334
SPP pupil pre physical apprearance	Mean		2.8800	.14360
	95% Confidence Interval for Mean	Lower Bound	2.5551	
		Upper Bound	3.2049	

Descriptives

			Statistic	Std. Error
	5% Trimmed Mean		2.8667	
	Median		2.9000	
	Variance		.206	
	Std. Deviation		.45412	
	Minimum		2.20	
	Maximum		3.80	
	Range		1.60	
	Interquartile Range		.58	
	Skewness		.634	.687
	Kurtosis		.817	1.334
SPP pupil pre behavioural conduct	Mean		2.6800	.20966
	95% Confidence Interval for Mean	Lower Bound	2.2057	
		Upper Bound	3.1543	
	5% Trimmed Mean		2.7167	
	Median		2.7500	
	Variance		.440	
	Std. Deviation		.66299	
	Minimum		1.20	
	Maximum		3.50	
	Range		2.30	
	Interquartile Range		.93	
	Skewness		-1.140	.687
	Kurtosis		1.901	1.334
SPP pupil pre global self worth	Mean		2.7500	.21820
	95% Confidence Interval for Mean	Lower Bound	2.2564	
		Upper Bound	3.2436	
	5% Trimmed Mean		2.7333	
	Median		2.8500	
	Variance		.476	
	Std. Deviation		.69001	
	Minimum		1.80	
	Maximum		4.00	
	Range		2.20	
	Interquartile Range		1.23	
	Skewness		.222	.687
	Kurtosis		-.456	1.334
SPP pupil post scholastic competence	Mean		2.6000	.21909
	95% Confidence Interval for Mean	Lower Bound	2.1044	
		Upper Bound	3.0956	
	5% Trimmed Mean		2.5889	
	Median		2.7500	
	Variance		.480	
	Std. Deviation		.69282	

Descriptives

			Statistic	Std. Error
	Minimum		1.70	
	Maximum		3.70	
	Range		2.00	
	Interquartile Range		1.28	
	Skewness		-.003	.687
	Kurtosis		-1.253	1.334
SPP pupil post social competence	Mean		2.7500	.25831
	95% Confidence Interval for Mean	Lower Bound	2.1657	
		Upper Bound	3.3343	
	5% Trimmed Mean		2.7611	
	Median		2.7500	
	Variance		.667	
	Std. Deviation		.81684	
	Minimum		1.50	
	Maximum		3.80	
	Range		2.30	
	Interquartile Range		1.53	
	Skewness		-.086	.687
	Kurtosis		-1.687	1.334
SPP pupil post athletic competence	Mean		2.6600	.20450
	95% Confidence Interval for Mean	Lower Bound	2.1974	
		Upper Bound	3.1226	
	5% Trimmed Mean		2.6222	
	Median		2.3000	
	Variance		.418	
	Std. Deviation		.64670	
	Minimum		2.00	
	Maximum		4.00	
	Range		2.00	
	Interquartile Range		1.03	
	Skewness		1.133	.687
	Kurtosis		.411	1.334
SPP pupil post physical appearance	Mean		3.1800	.22301
	95% Confidence Interval for Mean	Lower Bound	2.6755	
		Upper Bound	3.6845	
	5% Trimmed Mean		3.2111	
	Median		3.3500	
	Variance		.497	
	Std. Deviation		.70522	
	Minimum		1.80	
	Maximum		4.00	
	Range		2.20	
	Interquartile Range		1.05	

Descriptives

			Statistic	Std. Error
	Skewness		-.690	.687
	Kurtosis		-.033	1.334
SPP pupil post behavioural conduct	Mean		2.8100	.21932
	95% Confidence Interval for Mean	Lower Bound	2.3139	
		Upper Bound	3.3061	
	5% Trimmed Mean		2.7889	
	Median		2.7000	
	Variance		.481	
	Std. Deviation		.69354	
	Minimum		2.00	
	Maximum		4.00	
	Range		2.00	
	Interquartile Range		.95	
	Skewness		1.018	.687
	Kurtosis		.043	1.334
SPP pupil post global self worth	Mean		3.0800	.20591
	95% Confidence Interval for Mean	Lower Bound	2.6142	
		Upper Bound	3.5458	
	5% Trimmed Mean		3.0889	
	Median		3.2000	
	Variance		.424	
	Std. Deviation		.65115	
	Minimum		2.00	
	Maximum		4.00	
	Range		2.00	
	Interquartile Range		.87	
	Skewness		-.115	.687
	Kurtosis		-.460	1.334
SPP parent pre scholastic competence	Mean		2.6300	.34835
	95% Confidence Interval for Mean	Lower Bound	1.8420	
		Upper Bound	3.4180	
	5% Trimmed Mean		2.6444	
	Median		2.4500	
	Variance		1.213	
	Std. Deviation		1.10156	
	Minimum		1.00	
	Maximum		4.00	
	Range		3.00	
	Interquartile Range		2.10	
	Skewness		.017	.687
	Kurtosis		-1.627	1.334
SPP parent pre social competence	Mean		2.0800	.20645

Descriptives

			Statistic	Std. Error
competence	95% Confidence Interval for Mean	Lower Bound	1.6130	
		Upper Bound	2.5470	
	5% Trimmed Mean		2.0222	
	Median		1.8000	
	Variance		.426	
	Std. Deviation		.65286	
	Minimum		1.60	
	Maximum		3.60	
	Range		2.00	
	Interquartile Range		.77	
	Skewness		1.557	.687
	Kurtosis		2.486	1.334
SPP parent pre athletic competence	Mean		1.6400	.20450
	95% Confidence Interval for Mean	Lower Bound	1.1774	
		Upper Bound	2.1026	
	5% Trimmed Mean		1.6000	
	Median		1.6000	
	Variance		.418	
	Std. Deviation		.64670	
	Minimum		1.00	
	Maximum		3.00	
	Range		2.00	
	Interquartile Range		1.08	
	Skewness		1.039	.687
	Kurtosis		.832	1.334
SPP parent pre physical appreance	Mean		3.8800	.06110
	95% Confidence Interval for Mean	Lower Bound	3.7418	
		Upper Bound	4.0182	
	5% Trimmed Mean		3.8889	
	Median		4.0000	
	Variance		.037	
	Std. Deviation		.19322	
	Minimum		3.60	
	Maximum		4.00	
	Range		.40	
	Interquartile Range		.40	
	Skewness		-1.035	.687
	Kurtosis		-1.224	1.334
SPP parent pre behavioural conduct	Mean		2.9000	.18135
	95% Confidence Interval for Mean	Lower Bound	2.4898	
		Upper Bound	3.3102	
	5% Trimmed Mean		2.8722	
	Median		2.8000	

Descriptives

			Statistic	Std. Error
	Variance		.329	
	Std. Deviation		.57349	
	Minimum		2.30	
	Maximum		4.00	
	Range		1.70	
	Interquartile Range		1.00	
	Skewness		.605	.687
	Kurtosis		-.413	1.334
SPP parent post scholastic competence	Mean		2.7400	.30630
	95% Confidence Interval for Mean	Lower Bound	2.0471	
		Upper Bound	3.4329	
	5% Trimmed Mean		2.7500	
	Median		2.9500	
	Variance		.938	
	Std. Deviation		.96862	
	Minimum		1.30	
	Maximum		4.00	
	Range		2.70	
	Interquartile Range		2.00	
	Skewness		-.358	.687
	Kurtosis		-1.490	1.334
SPP parent post social acceptance	Mean		2.3100	.18883
	95% Confidence Interval for Mean	Lower Bound	1.8828	
		Upper Bound	2.7372	
	5% Trimmed Mean		2.2778	
	Median		2.0000	
	Variance		.357	
	Std. Deviation		.59712	
	Minimum		1.60	
	Maximum		3.60	
	Range		2.00	
	Interquartile Range		.70	
	Skewness		1.300	.687
	Kurtosis		1.332	1.334
SPP parent post athletic competence	Mean		1.6800	.24712
	95% Confidence Interval for Mean	Lower Bound	1.1210	
		Upper Bound	2.2390	
	5% Trimmed Mean		1.6278	
	Median		1.3000	
	Variance		.611	
	Std. Deviation		.78145	
	Minimum		1.00	
	Maximum		3.30	

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Descriptives

			Statistic	Std. Error
	Range		2.30	
	Interquartile Range		1.15	
	Skewness		1.161	.687
	Kurtosis		.535	1.334
SPP parent post physical apprearance	Mean		3.8600	.10349
	95% Confidence Interval for Mean	Lower Bound	3.6259	
		Upper Bound	4.0941	
	5% Trimmed Mean		3.9000	
	Median		4.0000	
	Variance		.107	
	Std. Deviation		.32728	
	Minimum		3.00	
	Maximum		4.00	
	Range		1.00	
	Interquartile Range		.10	
	Skewness		-2.503	.687
	Kurtosis		6.212	1.334
SPP parent post behavioural conduct	Mean		2.8000	.34026
	95% Confidence Interval for Mean	Lower Bound	2.0303	
		Upper Bound	3.5697	
	5% Trimmed Mean		2.8333	
	Median		3.1500	
	Variance		1.158	
	Std. Deviation		1.07600	
	Minimum		1.00	
	Maximum		4.00	
	Range		3.00	
	Interquartile Range		1.63	
	Skewness		-.937	.687
	Kurtosis		-.362	1.334
SSQ pupil pre	Mean		46.3000	1.50591
	95% Confidence Interval for Mean	Lower Bound	42.8934	
		Upper Bound	49.7066	
	5% Trimmed Mean		46.5000	
	Median		47.0000	
	Variance		22.678	
	Std. Deviation		4.76212	
	Minimum		37.00	
	Maximum		52.00	
	Range		15.00	
	Interquartile Range		7.75	
	Skewness		-.804	.687
	Kurtosis		-.019	1.334

Descriptives

			Statistic	Std. Error
SSQ pupil post	Mean		43.0000	2.21610
	95% Confidence Interval for Mean	Lower Bound	37.9868	
		Upper Bound	48.0132	
	5% Trimmed Mean		43.1111	
	Median		45.5000	
	Variance		49.111	
	Std. Deviation		7.00793	
	Minimum		31.00	
	Maximum		53.00	
	Range		22.00	
	Interquartile Range		11.25	
	Skewness		-.487	.687
	Kurtosis		-.710	1.334
SSQ teacher pre	Mean		38.2000	3.84361
	95% Confidence Interval for Mean	Lower Bound	29.5052	
		Upper Bound	46.8948	
	5% Trimmed Mean		38.6111	
	Median		36.0000	
	Variance		147.733	
	Std. Deviation		12.15456	
	Minimum		13.00	
	Maximum		56.00	
	Range		43.00	
	Interquartile Range		16.00	
	Skewness		-.554	.687
	Kurtosis		1.172	1.334
SSQ teacher post	Mean		34.6000	3.89929
	95% Confidence Interval for Mean	Lower Bound	25.7792	
		Upper Bound	43.4208	
	5% Trimmed Mean		34.3889	
	Median		36.5000	
	Variance		152.044	
	Std. Deviation		12.33063	
	Minimum		15.00	
	Maximum		58.00	
	Range		43.00	
	Interquartile Range		17.00	
	Skewness		.199	.687
	Kurtosis		.426	1.334
SSQ parent pre	Mean		42.9000	2.62657
	95% Confidence Interval for Mean	Lower Bound	36.9583	
		Upper Bound	48.8417	
	5% Trimmed Mean		43.1667	

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Descriptives

			Statistic	Std. Error
	Median		43.5000	
	Variance		68.989	
	Std. Deviation		8.30596	
	Minimum		27.00	
	Maximum		54.00	
	Range		27.00	
	Interquartile Range		15.00	
	Skewness		-.537	.687
	Kurtosis		-.104	1.334
SSQ parent post	Mean		41.9000	3.58841
	95% Confidence Interval for Mean	Lower Bound	33.7825	
		Upper Bound	50.0175	
	5% Trimmed Mean		42.2222	
	Median		42.0000	
	Variance		128.767	
	Std. Deviation		11.34754	
	Minimum		19.00	
	Maximum		59.00	
	Range		40.00	
	Interquartile Range		14.25	
	Skewness		-.485	.687
	Kurtosis		.895	1.334
SF pre attention	Mean		2.9000	.37859
	95% Confidence Interval for Mean	Lower Bound	2.0436	
		Upper Bound	3.7564	
	5% Trimmed Mean		2.8889	
	Median		3.0000	
	Variance		1.433	
	Std. Deviation		1.19722	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		2.00	
	Skewness		.233	.687
	Kurtosis		-.369	1.334
SF pre concentration	Mean		2.9000	.40689
	95% Confidence Interval for Mean	Lower Bound	1.9796	
		Upper Bound	3.8204	
	5% Trimmed Mean		2.8889	
	Median		3.0000	
	Variance		1.656	
	Std. Deviation		1.28668	
	Minimum		1.00	

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Descriptives

			Statistic	Std. Error
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		2.25	
	Skewness		-.164	.687
	Kurtosis		-.430	1.334
SF pre completion rate	Mean		2.8000	.29059
	95% Confidence Interval for Mean	Lower Bound	2.1426	
		Upper Bound	3.4574	
	5% Trimmed Mean		2.8333	
	Median		3.0000	
	Variance		.844	
	Std. Deviation		.91894	
	Minimum		1.00	
	Maximum		4.00	
	Range		3.00	
	Interquartile Range		1.25	
	Skewness		-.601	.687
	Kurtosis		.396	1.334
SF pre handwriting	Mean		2.9000	.40689
	95% Confidence Interval for Mean	Lower Bound	1.9796	
		Upper Bound	3.8204	
	5% Trimmed Mean		2.8889	
	Median		3.0000	
	Variance		1.656	
	Std. Deviation		1.28668	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		2.25	
	Skewness		-.164	.687
	Kurtosis		-.430	1.334
SF post attention	Mean		2.9500	.35316
	95% Confidence Interval for Mean	Lower Bound	2.1511	
		Upper Bound	3.7489	
	5% Trimmed Mean		2.8889	
	Median		2.5000	
	Variance		1.247	
	Std. Deviation		1.11679	
	Minimum		2.00	
	Maximum		5.00	
	Range		3.00	
	Interquartile Range		2.00	
	Skewness		.679	.687

Descriptives

			Statistic	Std. Error
	Kurtosis		-.936	1.334
SF post concentration	Mean		2.9500	.32016
	95% Confidence Interval for Mean	Lower Bound	2.2258	
		Upper Bound	3.6742	
	5% Trimmed Mean		2.8889	
	Median		3.0000	
	Variance		1.025	
	Std. Deviation		1.01242	
	Minimum		2.00	
	Maximum		5.00	
	Range		3.00	
	Interquartile Range		1.63	
	Skewness		.871	.687
	Kurtosis		.278	1.334
SF post completion rate	Mean		2.8000	.35901
	95% Confidence Interval for Mean	Lower Bound	1.9879	
		Upper Bound	3.6121	
	5% Trimmed Mean		2.7778	
	Median		3.0000	
	Variance		1.289	
	Std. Deviation		1.13529	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		1.25	
	Skewness		.478	.687
	Kurtosis		.552	1.334
SF post handwriting	Mean		3.0000	.39441
	95% Confidence Interval for Mean	Lower Bound	2.1078	
		Upper Bound	3.8922	
	5% Trimmed Mean		3.0000	
	Median		3.0000	
	Variance		1.556	
	Std. Deviation		1.24722	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		2.00	
	Skewness		.000	.687
	Kurtosis		-.912	1.334
SDQ teacher pre emotional	Mean		3.6000	.68638
	95% Confidence Interval for Mean	Lower Bound	2.0473	
		Upper Bound	5.1527	

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Descriptives

			Statistic	Std. Error
	5% Trimmed Mean		3.6667	
	Median		3.5000	
	Variance		4.711	
	Std. Deviation		2.17051	
	Minimum		.00	
	Maximum		6.00	
	Range		6.00	
	Interquartile Range		4.25	
	Skewness		-.333	.687
	Kurtosis		-1.154	1.334
SDQ teacher pre conduct	Mean		1.9000	.76667
	95% Confidence Interval for Mean	Lower Bound	.1657	
		Upper Bound	3.6343	
	5% Trimmed Mean		1.7222	
	Median		1.0000	
	Variance		5.878	
	Std. Deviation		2.42441	
	Minimum		.00	
	Maximum		7.00	
	Range		7.00	
	Interquartile Range		3.50	
	Skewness		1.315	.687
	Kurtosis		.865	1.334
SDQ teacher pre hyperactivity	Mean		6.4000	1.00222
	95% Confidence Interval for Mean	Lower Bound	4.1328	
		Upper Bound	8.6672	
	5% Trimmed Mean		6.5556	
	Median		7.0000	
	Variance		10.044	
	Std. Deviation		3.16930	
	Minimum		.00	
	Maximum		10.00	
	Range		10.00	
	Interquartile Range		5.25	
	Skewness		-.773	.687
	Kurtosis		.282	1.334
SDQ teacher pre peer relationship	Mean		2.9000	.70632
	95% Confidence Interval for Mean	Lower Bound	1.3022	
		Upper Bound	4.4978	
	5% Trimmed Mean		2.8333	
	Median		2.5000	
	Variance		4.989	
	Std. Deviation		2.23358	

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Descriptives

			Statistic	Std. Error
	Minimum		.00	
	Maximum		7.00	
	Range		7.00	
	Interquartile Range		3.50	
	Skewness		.754	.687
	Kurtosis		-.178	1.334
SDQ teacher pre prosocial behaviour	Mean		6.5000	.89753
	95% Confidence Interval for Mean	Lower Bound	4.4697	
		Upper Bound	8.5303	
	5% Trimmed Mean		6.6111	
	Median		6.0000	
	Variance		8.056	
	Std. Deviation		2.83823	
	Minimum		1.00	
	Maximum		10.00	
	Range		9.00	
	Interquartile Range		4.50	
	Skewness		-.492	.687
	Kurtosis		.045	1.334
SDQ teacher pre total	Mean		14.8000	1.77514
	95% Confidence Interval for Mean	Lower Bound	10.7844	
		Upper Bound	18.8156	
	5% Trimmed Mean		14.7778	
	Median		14.5000	
	Variance		31.511	
	Std. Deviation		5.61348	
	Minimum		6.00	
	Maximum		24.00	
	Range		18.00	
	Interquartile Range		10.25	
	Skewness		.184	.687
	Kurtosis		-.714	1.334
SDQ teacher post emotional	Mean		3.0000	.55777
	95% Confidence Interval for Mean	Lower Bound	1.7382	
		Upper Bound	4.2618	
	5% Trimmed Mean		3.0000	
	Median		3.5000	
	Variance		3.111	
	Std. Deviation		1.76383	
	Minimum		.00	
	Maximum		6.00	
	Range		6.00	
	Interquartile Range		2.25	

Descriptives

			Statistic	Std. Error
	Skewness		-.152	.687
	Kurtosis		-.190	1.334
SDQ teacher post conduct	Mean		2.4000	.65320
	95% Confidence Interval for Mean	Lower Bound	.9224	
		Upper Bound	3.8776	
	5% Trimmed Mean		2.3889	
	Median		2.5000	
	Variance		4.267	
	Std. Deviation		2.06559	
	Minimum		.00	
	Maximum		5.00	
	Range		5.00	
	Interquartile Range		4.25	
	Skewness		-.011	.687
	Kurtosis		-1.845	1.334
SDQ teacher post hyperactivity	Mean		6.5000	.94575
	95% Confidence Interval for Mean	Lower Bound	4.3606	
		Upper Bound	8.6394	
	5% Trimmed Mean		6.6667	
	Median		7.0000	
	Variance		8.944	
	Std. Deviation		2.99073	
	Minimum		.00	
	Maximum		10.00	
	Range		10.00	
	Interquartile Range		3.50	
	Skewness		-.981	.687
	Kurtosis		1.432	1.334
SDQ teacher post peer relationship	Mean		2.4000	.58119
	95% Confidence Interval for Mean	Lower Bound	1.0853	
		Upper Bound	3.7147	
	5% Trimmed Mean		2.3333	
	Median		2.0000	
	Variance		3.378	
	Std. Deviation		1.83787	
	Minimum		.00	
	Maximum		6.00	
	Range		6.00	
	Interquartile Range		3.00	
	Skewness		.736	.687
	Kurtosis		-.017	1.334
SDQ teacher post	Mean		4.3000	.85700

Descriptives

			Statistic	Std. Error
prosocial	95% Confidence Interval for Mean	Lower Bound	2.3613	
		Upper Bound	6.2387	
	5% Trimmed Mean		4.1667	
	Median		3.5000	
	Variance		7.344	
	Std. Deviation		2.71006	
	Minimum		1.00	
	Maximum		10.00	
	Range		9.00	
	Interquartile Range		4.00	
	Skewness		.944	.687
	Kurtosis		.763	1.334
SDQ teacher post total	Mean		14.3000	1.49108
	95% Confidence Interval for Mean	Lower Bound	10.9269	
		Upper Bound	17.6731	
	5% Trimmed Mean		14.1667	
	Median		14.0000	
	Variance		22.233	
	Std. Deviation		4.71522	
	Minimum		8.00	
	Maximum		23.00	
	Range		15.00	
	Interquartile Range		8.00	
	Skewness		.441	.687
	Kurtosis		-.570	1.334
SDQ parent pre emotional	Mean		4.8000	.78599
	95% Confidence Interval for Mean	Lower Bound	3.0220	
		Upper Bound	6.5780	
	5% Trimmed Mean		4.7222	
	Median		3.5000	
	Variance		6.178	
	Std. Deviation		2.48551	
	Minimum		2.00	
	Maximum		9.00	
	Range		7.00	
	Interquartile Range		4.25	
	Skewness		.664	.687
	Kurtosis		-1.220	1.334
SDQ parent pre conduct	Mean		1.9000	.56667
	95% Confidence Interval for Mean	Lower Bound	.6181	
		Upper Bound	3.1819	
	5% Trimmed Mean		1.7778	
	Median		1.5000	

Descriptives

			Statistic	Std. Error
	Variance		3.211	
	Std. Deviation		1.79196	
	Minimum		.00	
	Maximum		6.00	
	Range		6.00	
	Interquartile Range		2.25	
	Skewness		1.344	.687
	Kurtosis		2.297	1.334
SDQ parent pre hyperactivity	Mean		7.1000	.70632
	95% Confidence Interval for Mean	Lower Bound	5.5022	
		Upper Bound	8.6978	
	5% Trimmed Mean		7.1667	
	Median		7.5000	
	Variance		4.989	
	Std. Deviation		2.23358	
	Minimum		3.00	
	Maximum		10.00	
	Range		7.00	
	Interquartile Range		3.50	
	Skewness		-.754	.687
	Kurtosis		-.178	1.334
SDQ parent pre peer relationship	Mean		4.1000	.65744
	95% Confidence Interval for Mean	Lower Bound	2.6128	
		Upper Bound	5.5872	
	5% Trimmed Mean		4.1111	
	Median		4.0000	
	Variance		4.322	
	Std. Deviation		2.07900	
	Minimum		1.00	
	Maximum		7.00	
	Range		6.00	
	Interquartile Range		4.25	
	Skewness		.113	.687
	Kurtosis		-1.001	1.334
SDQ parent pre prosocial	Mean		6.7000	.98939
	95% Confidence Interval for Mean	Lower Bound	4.4618	
		Upper Bound	8.9382	
	5% Trimmed Mean		6.8889	
	Median		7.5000	
	Variance		9.789	
	Std. Deviation		3.12872	
	Minimum		.00	
	Maximum		10.00	

Descriptives

			Statistic	Std. Error
	Range		10.00	
	Interquartile Range		5.00	
	Skewness		-1.204	.687
	Kurtosis		.960	1.334
SDQ parent pre total	Mean		17.9000	1.66966
	95% Confidence Interval for Mean	Lower Bound	14.1230	
		Upper Bound	21.6770	
	5% Trimmed Mean		17.8333	
	Median		18.0000	
	Variance		27.878	
	Std. Deviation		5.27994	
	Minimum		10.00	
	Maximum		27.00	
	Range		17.00	
	Interquartile Range		8.25	
	Skewness		.183	.687
	Kurtosis		-.834	1.334
SDQ parent post emotional	Mean		3.8000	.61101
	95% Confidence Interval for Mean	Lower Bound	2.4178	
		Upper Bound	5.1822	
	5% Trimmed Mean		3.8333	
	Median		4.0000	
	Variance		3.733	
	Std. Deviation		1.93218	
	Minimum		.00	
	Maximum		7.00	
	Range		7.00	
	Interquartile Range		2.25	
	Skewness		-.457	.687
	Kurtosis		.843	1.334
SDQ parent post conduct	Mean		2.7000	.65064
	95% Confidence Interval for Mean	Lower Bound	1.2281	
		Upper Bound	4.1719	
	5% Trimmed Mean		2.6667	
	Median		2.0000	
	Variance		4.233	
	Std. Deviation		2.05751	
	Minimum		.00	
	Maximum		6.00	
	Range		6.00	
	Interquartile Range		3.50	
	Skewness		.695	.687
	Kurtosis		-.556	1.334

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Descriptives

			Statistic	Std. Error
SDQ parent post hyperactivity	Mean		6.4000	.45216
	95% Confidence Interval for Mean	Lower Bound	5.3772	
		Upper Bound	7.4228	
	5% Trimmed Mean		6.4444	
	Median		6.5000	
	Variance		2.044	
	Std. Deviation		1.42984	
	Minimum		4.00	
	Maximum		8.00	
	Range		4.00	
	Interquartile Range		3.00	
	Skewness		-.319	.687
	Kurtosis		-1.163	1.334
SDQ parent post peer relationship	Mean		3.4000	.65320
	95% Confidence Interval for Mean	Lower Bound	1.9224	
		Upper Bound	4.8776	
	5% Trimmed Mean		3.4444	
	Median		3.0000	
	Variance		4.267	
	Std. Deviation		2.06559	
	Minimum		.00	
	Maximum		6.00	
	Range		6.00	
	Interquartile Range		4.00	
	Skewness		.083	.687
	Kurtosis		-.953	1.334
SDQ parent post prosocial	Mean		6.1000	1.15902
	95% Confidence Interval for Mean	Lower Bound	3.4781	
		Upper Bound	8.7219	
	5% Trimmed Mean		6.2222	
	Median		7.0000	
	Variance		13.433	
	Std. Deviation		3.66515	
	Minimum		.00	
	Maximum		10.00	
	Range		10.00	
	Interquartile Range		5.50	
	Skewness		-.861	.687
	Kurtosis		-.324	1.334
SDQ parent post total	Mean		16.3000	1.27410
	95% Confidence Interval for Mean	Lower Bound	13.4178	
		Upper Bound	19.1822	
	5% Trimmed Mean		16.5556	

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Descriptives

			Statistic	Std. Error
	Median		17.5000	
	Variance		16.233	
	Std. Deviation		4.02906	
	Minimum		7.00	
	Maximum		21.00	
	Range		14.00	
	Interquartile Range		5.25	
	Skewness		-1.484	.687
	Kurtosis		2.484	1.334
DCDQ pre control movement	Mean		15.5000	.87242
	95% Confidence Interval for Mean	Lower Bound	13.5265	
		Upper Bound	17.4735	
	5% Trimmed Mean		15.2222	
	Median		15.0000	
	Variance		7.611	
	Std. Deviation		2.75882	
	Minimum		13.00	
	Maximum		23.00	
	Range		10.00	
	Interquartile Range		1.25	
	Skewness		2.639	.687
	Kurtosis		7.768	1.334
DCDQ pre handwriting	Mean		10.3000	1.07548
	95% Confidence Interval for Mean	Lower Bound	7.8671	
		Upper Bound	12.7329	
	5% Trimmed Mean		10.3333	
	Median		11.0000	
	Variance		11.567	
	Std. Deviation		3.40098	
	Minimum		5.00	
	Maximum		15.00	
	Range		10.00	
	Interquartile Range		5.75	
	Skewness		-.554	.687
	Kurtosis		-.723	1.334
DCDQ pre coordination	Mean		11.2000	.72725
	95% Confidence Interval for Mean	Lower Bound	9.5549	
		Upper Bound	12.8451	
	5% Trimmed Mean		11.1667	
	Median		11.0000	
	Variance		5.289	
	Std. Deviation		2.29976	
	Minimum		8.00	

Descriptives

			Statistic	Std. Error
	Maximum		15.00	
	Range		7.00	
	Interquartile Range		4.25	
	Skewness		.312	.687
	Kurtosis		-.948	1.334
DCDQ pre total	Mean		37.0000	1.24722
	95% Confidence Interval for Mean	Lower Bound	34.1786	
		Upper Bound	39.8214	
	5% Trimmed Mean		37.0556	
	Median		36.5000	
	Variance		15.556	
	Std. Deviation		3.94405	
	Minimum		31.00	
	Maximum		42.00	
	Range		11.00	
	Interquartile Range		6.75	
	Skewness		-.190	.687
	Kurtosis		-1.464	1.334
DCDQ post control movement	Mean		19.5000	1.19490
	95% Confidence Interval for Mean	Lower Bound	16.7970	
		Upper Bound	22.2030	
	5% Trimmed Mean		19.5556	
	Median		20.0000	
	Variance		14.278	
	Std. Deviation		3.77859	
	Minimum		13.00	
	Maximum		25.00	
	Range		12.00	
	Interquartile Range		5.75	
	Skewness		-.626	.687
	Kurtosis		-.301	1.334
DCDQ post handwriting	Mean		10.7000	.76085
	95% Confidence Interval for Mean	Lower Bound	8.9788	
		Upper Bound	12.4212	
	5% Trimmed Mean		10.7778	
	Median		11.0000	
	Variance		5.789	
	Std. Deviation		2.40601	
	Minimum		6.00	
	Maximum		14.00	
	Range		8.00	
	Interquartile Range		3.50	
	Skewness		-.397	.687

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Descriptives

			Statistic	Std. Error
	Kurtosis		.513	1.334
DCDQ post coordination	Mean		12.7000	1.22066
	95% Confidence Interval for Mean	Lower Bound	9.9387	
		Upper Bound	15.4613	
	5% Trimmed Mean		12.7222	
	Median		13.0000	
	Variance		14.900	
	Std. Deviation		3.86005	
	Minimum		7.00	
	Maximum		18.00	
	Range		11.00	
	Interquartile Range		6.75	
	Skewness		-.121	.687
	Kurtosis		-1.458	1.334
DCDQ post total	Mean		42.9000	2.28254
	95% Confidence Interval for Mean	Lower Bound	37.7365	
		Upper Bound	48.0635	
	5% Trimmed Mean		43.0556	
	Median		43.0000	
	Variance		52.100	
	Std. Deviation		7.21803	
	Minimum		31.00	
	Maximum		52.00	
	Range		21.00	
	Interquartile Range		12.25	
	Skewness		-.356	.687
	Kurtosis		-1.189	1.334

Extreme Values

			Case Number	Value
Age in months	Highest	1	10	140
		2	7	137
		3	5	131
		4	1	119
		5	4	115
	Lowest	1	6	99
		2	2	101
		3	3	103
		4	8	104
		5	9	113
Social Communication Questionnaire	Highest	1	9	22.00
		2	10	18.00
		3	8	17.00
		4	6	14.00
		5	7	14.00
	Lowest	1	5	6.00
		2	2	7.00
		3	3	12.00
		4	4	13.00
		5	1	13.00
MABC2pre manual dexterity	Highest	1	7	9.00
		2	9	9.00
		3	1	5.00
		4	2	5.00
		5	8	5.00[a]
	Lowest	1	3	.50
		2	6	1.00
		3	5	1.00
		4	4	1.00
		5	10	5.00[b]
MABC2pre aiming and catching	Highest	1	7	37.00
		2	2	25.00
		3	8	16.00
		4	9	16.00
		5	3	5.00[a]
	Lowest	1	5	1.00
		2	6	2.00
		3	1	2.00
		4	10	5.00
		5	4	5.00[b]
MABC2pre balance	Highest	1	4	63.00
		2	2	50.00

Extreme Values

			Case Number	Value
		3	5	37.00
		4	8	25.00
		5	10	25.00
	Lowest	1	3	1.00
		2	6	2.00
		3	1	2.00
		4	7	9.00
		5	9	16.00
MABC2pre total	Highest	1	2	9.00
		2	7	9.00
		3	9	9.00
		4	4	5.00
		5	8	5.00[a]
	Lowest	1	6	.50
		2	3	.50
		3	1	1.00
		4	5	2.00
		5	10	5.00[b]
MABC2post manual dexterity	Highest	1	10	50.00
		2	2	25.00
		3	9	25.00
		4	7	16.00
		5	3	9.00[c]
	Lowest	1	6	1.00
		2	1	1.00
		3	5	5.00
		4	8	9.00
		5	4	9.00[d]
MABC2post aiming and catching	Highest	1	2	75.00
		2	7	37.00
		3	9	37.00
		4	10	37.00
		5	1	25.00[e]
	Lowest	1	5	.50
		2	6	2.00
		3	3	5.00
		4	8	25.00
		5	4	25.00[f]
MABC2post balance	Highest	1	8	98.00
		2	2	91.00

Extreme Values

			Case Number	Value
		3	5	91.00
		4	7	75.00
		5	4	50.00[g]
	Lowest	1	6	9.00
		2	3	25.00
		3	1	25.00
		4	9	37.00
		5	10	50.00[h]
MABC2post total	Highest	1	2	63.00
		2	7	37.00
		3	8	37.00
		4	10	37.00
		5	9	25.00
	Lowest	1	6	1.00
		2	3	5.00
		3	1	5.00
		4	5	9.00
		5	4	16.00
SPP pupil pre scholastic competence	Highest	1	1	3.50
		2	2	2.80
		3	4	2.70
		4	5	2.70
		5	3	2.50
	Lowest	1	9	1.30
		2	7	1.70
		3	6	1.80
		4	8	2.00
		5	10	2.30
SPP pupil pre social competence	Highest	1	4	3.50
		2	7	3.30
		3	2	3.00
		4	8	3.00
		5	5	2.80[i]
	Lowest	1	10	1.80
		2	9	2.20
		3	3	2.20
		4	1	2.50
		5	6	2.80[j]
SPP pupil pre athletic competence	Highest	1	2	3.70
		2	6	2.80

Extreme Values

			Case Number	Value
		3	8	2.70
		4	1	2.30
		5	4	2.20
	Lowest	1	9	1.30
		2	7	1.30
		3	5	1.70
		4	10	1.80
		5	3	1.80
SPP pupil pre physical apprearance	Highest	1	3	3.80
		2	1	3.30
		3	6	3.00
		4	8	3.00
		5	9	3.00
	Lowest	1	2	2.20
		2	10	2.50
		3	5	2.50
		4	7	2.70
		5	4	2.80
SPP pupil pre behavioural conduct	Highest	1	3	3.50
		2	6	3.30
		3	2	3.20
		4	1	3.00
		5	5	2.80
	Lowest	1	9	1.20
		2	8	2.30
		3	4	2.30
		4	10	2.50
		5	7	2.70
SPP pupil pre global self worth	Highest	1	3	4.00
		2	1	3.30
		3	2	3.20
		4	6	3.00
		5	8	3.00
	Lowest	1	5	1.80
		2	9	2.00
		3	4	2.00
		4	10	2.50
		5	7	2.70
SPP pupil post scholastic competence	Highest	1	1	3.70
		2	3	3.30

Extreme Values

			Case Number	Value
		3	4	3.00
		4	5	3.00
		5	2	2.80
	Lowest	1	9	1.70
		2	7	1.80
		3	6	1.80
		4	8	2.20
		5	10	2.70
SPP pupil post social competence	Highest	1	2	3.80
		2	4	3.60
		3	8	3.60
		4	1	3.20
		5	7	3.20
	Lowest	1	3	1.50
		2	10	2.00
		3	6	2.10
		4	5	2.20
		5	9	2.30
SPP pupil post athletic competence	Highest	1	2	4.00
		2	4	3.30
		3	8	3.20
		4	9	2.80
		5	1	2.30[k]
	Lowest	1	6	2.00
		2	10	2.20
		3	5	2.20
		4	7	2.30
		5	3	2.30[l]
SPP pupil post physical appearance	Highest	1	2	4.00
		2	3	4.00
		3	4	3.70
		4	1	3.50
		5	8	3.50
	Lowest	1	6	1.80
		2	9	2.50
		3	10	2.80
		4	7	2.80
		5	5	3.20
SPP pupil post behavioural conduct	Highest	1	2	4.00
		2	3	4.00

Extreme Values

			Case Number	Value
		3	1	3.00
		4	5	2.80
		5	4	2.70[m]
	Lowest	1	6	2.00
		2	10	2.30
		3	8	2.30
		4	7	2.30
		5	9	2.70[n]
SPP pupil post global self worth	Highest	1	3	4.00
		2	8	4.00
		3	2	3.30
		4	4	3.30
		5	1	3.20[o]
	Lowest	1	6	2.00
		2	5	2.30
		3	9	2.70
		4	10	2.80
		5	7	3.20[p]
SPP parent pre scholastic competence	Highest	1	1	4.00
		2	3	4.00
		3	5	3.60
		4	10	3.60
		5	7	2.60
	Lowest	1	8	1.00
		2	9	1.60
		3	4	1.60
		4	6	2.00
		5	2	2.30
SPP parent pre social competence	Highest	1	5	3.60
		2	10	2.60
		3	2	2.30
		4	4	2.30
		5	1	2.00
	Lowest	1	9	1.60
		2	8	1.60
		3	7	1.60
		4	6	1.60
		5	3	1.60
SPP parent pre athletic competence	Highest	1	8	3.00
		2	5	2.30

Extreme Values

			Case Number	Value
		3	7	2.00
		4	1	1.60
		5	4	1.60[q]
	Lowest	1	10	1.00
		2	3	1.00
		3	2	1.00
		4	9	1.30
		5	6	1.60[r]
SPP parent pre physical appreance	Highest	1	2	4.00
		2	4	4.00
		3	5	4.00
		4	6	4.00
		5	7	4.00[s]
	Lowest	1	10	3.60
		2	3	3.60
		3	1	3.60
		4	9	4.00
		5	8	4.00[t]
SPP parent pre behavioural conduct	Highest	1	2	4.00
		2	3	3.30
		3	5	3.30
		4	7	3.30
		5	10	3.00
	Lowest	1	9	2.30
		2	8	2.30
		3	6	2.30
		4	4	2.60
		5	1	2.60
SPP parent post scholastic competence	Highest	1	5	4.00
		2	3	3.60
		3	10	3.60
		4	1	3.30
		5	6	3.30
	Lowest	1	4	1.30
		2	9	1.60
		3	7	1.60
		4	2	2.50
		5	8	2.60
SPP parent post social acceptance	Highest	1	8	3.60
		2	5	3.00

Extreme Values

			Case Number	Value
		3	10	2.60
		4	6	2.30
		5	1	2.00[u]
	Lowest	1	4	1.60
		2	9	2.00
		3	7	2.00
		4	3	2.00
		5	2	2.00[v]
SPP parent post athletic competence	Highest	1	8	3.30
		2	7	2.60
		3	1	2.00
		4	5	2.00
		5	2	1.30[w]
	Lowest	1	9	1.00
		2	6	1.00
		3	3	1.00
		4	10	1.30
		5	4	1.30[x]
SPP parent post physical apprearance	Highest	1	3	4.00
		2	4	4.00
		3	5	4.00
		4	6	4.00
		5	7	4.00[s]
	Lowest	1	2	3.00
		2	1	3.60
		3	10	4.00
		4	9	4.00
		5	8	4.00[t]
SPP parent post behavioural conduct	Highest	1	8	4.00
		2	3	3.60
		3	6	3.60
		4	10	3.60
		5	5	3.30
	Lowest	1	7	1.00
		2	4	1.00
		3	9	2.30
		4	1	2.60
		5	2	3.00
SSQ pupil pre	Highest	1	3	52.00
		2	6	51.00

Extreme Values

			Case Number	Value
		3	8	50.00
		4	1	49.00
		5	7	48.00
	Lowest	1	4	37.00
		2	9	41.00
		3	10	43.00
		4	5	46.00
		5	2	46.00
SSQ pupil post	Highest	1	2	53.00
		2	1	49.00
		3	7	48.00
		4	3	46.00
		5	8	46.00
	Lowest	1	6	31.00
		2	4	34.00
		3	9	38.00
		4	5	40.00
		5	10	45.00
SSQ teacher pre	Highest	1	3	56.00
		2	7	52.00
		3	5	48.00
		4	8	41.00
		5	4	37.00
	Lowest	1	1	13.00
		2	9	33.00
		3	6	33.00
		4	10	34.00
		5	2	35.00
SSQ teacher post	Highest	1	3	58.00
		2	10	43.00
		3	5	42.00
		4	6	38.00
		5	2	37.00
	Lowest	1	1	15.00
		2	4	20.00
		3	9	27.00
		4	8	30.00
		5	7	36.00
SSQ parent pre	Highest	1	6	54.00
		2	2	51.00

Extreme Values

			Case Number	Value
		3	5	51.00
		4	3	46.00
		5	7	45.00
	Lowest	1	4	27.00
		2	10	36.00
		3	1	36.00
		4	9	41.00
		5	8	42.00
SSQ parent post	Highest	1	6	59.00
		2	8	55.00
		3	5	49.00
		4	10	45.00
		5	1	42.00[y]
	Lowest	1	4	19.00
		2	7	34.00
		3	9	37.00
		4	3	37.00
		5	2	42.00[z]
SF pre attention	Highest	1	3	5.00
		2	7	4.00
		3	10	4.00
		4	4	3.00
		5	5	3.00[aa]
	Lowest	1	1	1.00
		2	9	2.00
		3	6	2.00
		4	2	2.00
		5	8	3.00[ab]
SF pre concentration	Highest	1	3	5.00
		2	7	4.00
		3	10	4.00
		4	2	3.00
		5	4	3.00[aa]
	Lowest	1	6	1.00
		2	1	1.00
		3	9	2.00
		4	8	3.00
		5	5	3.00[ab]
SF pre completion rate	Highest	1	3	4.00
		2	4	4.00

Extreme Values

			Case Number	Value
		3	2	3.00
		4	5	3.00
		5	7	3.00[a]
	Lowest	1	9	1.00
		2	6	2.00
		3	1	2.00
		4	10	3.00
		5	8	3.00[b]
SF pre handwriting	Highest	1	5	5.00
		2	4	4.00
		3	10	4.00
		4	3	3.00
		5	6	3.00[a]
	Lowest	1	9	1.00
		2	1	1.00
		3	2	2.00
		4	8	3.00
		5	7	3.00[b]
SF post attention	Highest	1	3	5.00
		2	5	4.00
		3	10	4.00
		4	6	3.50
		5	4	3.00
	Lowest	1	9	2.00
		2	8	2.00
		3	7	2.00
		4	2	2.00
		5	1	2.00
SF post concentration	Highest	1	3	5.00
		2	10	4.00
		3	6	3.50
		4	2	3.00
		5	4	3.00[a]
	Lowest	1	9	2.00
		2	8	2.00
		3	7	2.00
		4	1	2.00
		5	5	3.00[b]
SF post completion rate	Highest	1	3	5.00
		2	10	4.00

Extreme Values

			Case Number	Value
		3	2	3.00
		4	4	3.00
		5	5	3.00[aa]
	Lowest	1	9	1.00
		2	8	2.00
		3	6	2.00
		4	1	2.00
		5	7	3.00[ab]
SF post handwriting	Highest	1	5	5.00
		2	3	4.00
		3	7	4.00
		4	10	4.00
		5	4	3.00[aa]
	Lowest	1	9	1.00
		2	8	2.00
		3	2	2.00
		4	1	2.00
		5	6	3.00[ab]
SDQ teacher pre emotional	Highest	1	3	6.00
		2	4	6.00
		3	10	6.00
		4	6	5.00
		5	2	4.00
	Lowest	1	7	.00
		2	8	1.00
		3	5	2.00
		4	9	3.00
		5	1	3.00
SDQ teacher pre conduct	Highest	1	9	7.00
		2	1	5.00
		3	10	3.00
		4	6	2.00
		5	4	1.00[ac]
	Lowest	1	8	.00
		2	7	.00
		3	3	.00
		4	2	.00
		5	5	1.00[ad]
SDQ teacher pre hyperactivity	Highest	1	6	10.00
		2	10	10.00

Extreme Values

			Case Number	Value
		3	8	9.00
		4	9	8.00
		5	1	7.00[ae]
	Lowest	1	3	.00
		2	7	4.00
		3	4	4.00
		4	2	5.00
		5	5	7.00[af]
SDQ teacher pre peer relationship	Highest	1	6	7.00
		2	2	6.00
		3	3	4.00
		4	4	3.00
		5	9	3.00
	Lowest	1	8	.00
		2	10	1.00
		3	1	1.00
		4	7	2.00
		5	5	2.00
SDQ teacher pre prosocial behaviour	Highest	1	3	10.00
		2	7	10.00
		3	6	9.00
		4	5	8.00
		5	2	6.00[ag]
	Lowest	1	1	1.00
		2	10	4.00
		3	8	5.00
		4	9	6.00
		5	4	6.00[ah]
SDQ teacher pre total	Highest	1	6	24.00
		2	9	21.00
		3	10	20.00
		4	1	16.00
		5	2	15.00
	Lowest	1	7	6.00
		2	8	10.00
		3	3	10.00
		4	5	12.00
		5	4	14.00
SDQ teacher post emotional	Highest	1	4	6.00
		2	1	4.00

Extreme Values

			Case Number	Value
		3	2	4.00
		4	3	4.00
		5	6	4.00
	Lowest	1	9	.00
		2	7	1.00
		3	10	2.00
		4	8	2.00
		5	5	3.00
SDQ teacher post conduct	Highest	1	6	5.00
		2	8	5.00
		3	1	4.00
		4	9	4.00
		5	4	3.00
	Lowest	1	5	.00
		2	3	.00
		3	2	.00
		4	10	1.00
		5	7	2.00
SDQ teacher post hyperactivity	Highest	1	6	10.00
		2	8	10.00
		3	1	8.00
		4	5	8.00
		5	7	8.00
	Lowest	1	3	.00
		2	10	5.00
		3	9	5.00
		4	2	5.00
		5	4	6.00
SDQ teacher post peer relationship	Highest	1	2	6.00
		2	3	4.00
		3	6	4.00
		4	4	3.00
		5	7	2.00[u]
	Lowest	1	5	.00
		2	9	1.00
		3	8	1.00
		4	1	1.00
		5	10	2.00[v]
SDQ teacher post prosocial	Highest	1	3	10.00
		2	2	6.00

Extreme Values

			Case Number	Value
		3	5	6.00
		4	6	6.00
		5	10	4.00
	Lowest	1	1	1.00
		2	7	2.00
		3	4	2.00
		4	9	3.00
		5	8	3.00
SDQ teacher post total	Highest	1	6	23.00
		2	4	18.00
		3	8	18.00
		4	1	17.00
		5	2	15.00
	Lowest	1	3	8.00
		2	10	10.00
		3	9	10.00
		4	5	11.00
		5	7	13.00
SDQ parent pre emotional	Highest	1	9	9.00
		2	3	8.00
		3	10	7.00
		4	1	6.00
		5	5	4.00
	Lowest	1	4	2.00
		2	8	3.00
		3	7	3.00
		4	6	3.00
		5	2	3.00
SDQ parent pre conduct	Highest	1	4	6.00
		2	2	3.00
		3	9	3.00
		4	1	2.00
		5	8	2.00
	Lowest	1	7	.00
		2	6	.00
		3	10	1.00
		4	5	1.00
		5	3	1.00
SDQ parent pre hyperactivity	Highest	1	8	10.00
		2	1	9.00

Extreme Values

			Case Number	Value
		3	6	9.00
		4	9	8.00
		5	10	8.00
	Lowest	1	5	3.00
		2	4	4.00
		3	2	6.00
		4	7	7.00
		5	3	7.00
SDQ parent pre peer relationship	Highest	1	8	7.00
		2	9	7.00
		3	10	6.00
		4	1	4.00
		5	2	4.00[e]
	Lowest	1	6	1.00
		2	5	2.00
		3	4	2.00
		4	7	4.00
		5	3	4.00[f]
SDQ parent pre prosocial	Highest	1	6	10.00
		2	2	9.00
		3	3	9.00
		4	5	9.00
		5	7	8.00
	Lowest	1	4	.00
		2	10	4.00
		3	1	4.00
		4	9	7.00
		5	8	7.00
SDQ parent pre total	Highest	1	9	27.00
		2	8	22.00
		3	10	22.00
		4	1	21.00
		5	3	20.00
	Lowest	1	5	10.00
		2	6	13.00
		3	7	14.00
		4	4	14.00
		5	2	16.00
SDQ parent post emotional	Highest	1	3	7.00
		2	2	5.00

Extreme Values

			Case Number	Value
		3	9	5.00
		4	10	5.00
		5	1	4.00[s]
	Lowest	1	8	.00
		2	7	2.00
		3	6	3.00
		4	4	3.00
		5	5	4.00[t]
SDQ parent post conduct	Highest	1	4	6.00
		2	7	6.00
		3	2	4.00
		4	1	3.00
		5	5	2.00[u]
	Lowest	1	3	.00
		2	8	1.00
		3	6	1.00
		4	10	2.00
		5	9	2.00[v]
SDQ parent post hyperactivity	Highest	1	2	8.00
		2	4	8.00
		3	9	8.00
		4	6	7.00
		5	7	7.00
	Lowest	1	1	4.00
		2	5	5.00
		3	3	5.00
		4	10	6.00
		5	8	6.00
SDQ parent post peer relationship	Highest	1	3	6.00
		2	5	6.00
		3	9	6.00
		4	10	4.00
		5	6	3.00[aa]
	Lowest	1	8	.00
		2	4	2.00
		3	2	2.00
		4	1	2.00
		5	7	3.00[ab]
SDQ parent post prosocial	Highest	1	6	10.00
		2	8	10.00

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Extreme Values

			Case Number	Value
		3	5	9.00
		4	2	8.00
		5	3	7.00[ae]
	Lowest	1	7	.00
		2	4	.00
		3	10	5.00
		4	1	5.00
		5	9	7.00[af]
SDQ parent post total	Highest	1	9	21.00
		2	2	19.00
		3	4	19.00
		4	3	18.00
		5	7	18.00
	Lowest	1	8	7.00
		2	1	13.00
		3	6	14.00
		4	10	17.00
		5	5	17.00
DCDQ pre control movement	Highest	1	8	23.00
		2	5	16.00
		3	1	15.00
		4	4	15.00
		5	6	15.00[ai]
	Lowest	1	3	13.00
		2	10	14.00
		3	2	14.00
		4	9	15.00
		5	7	15.00[aj]
DCDQ pre handwriting	Highest	1	5	15.00
		2	6	13.00
		3	10	13.00
		4	2	12.00
		5	9	12.00
	Lowest	1	8	5.00
		2	7	5.00
		3	1	8.00
		4	4	10.00
		5	3	10.00
DCDQ pre coordination	Highest	1	4	15.00
		2	10	14.00

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Extreme Values

			Case Number	Value
		3	8	13.00
		4	1	12.00
		5	5	11.00[ak]
	Lowest	1	9	8.00
		2	3	9.00
		3	2	9.00
		4	6	10.00
		5	7	11.00[al]
DCDQ pre total	Highest	1	5	42.00
		2	8	41.00
		3	10	41.00
		4	4	40.00
		5	6	38.00
	Lowest	1	7	31.00
		2	3	32.00
		3	9	35.00
		4	2	35.00
		5	1	35.00
DCDQ post control movement	Highest	1	8	25.00
		2	3	22.00
		3	6	22.00
		4	7	22.00
		5	2	20.00[am]
	Lowest	1	5	13.00
		2	4	14.00
		3	1	17.00
		4	10	20.00
		5	9	20.00[an]
DCDQ post handwriting	Highest	1	3	14.00
		2	10	14.00
		3	1	12.00
		4	5	11.00
		5	6	11.00[ak]
	Lowest	1	7	6.00
		2	8	9.00
		3	4	9.00
		4	2	10.00
		5	9	11.00[al]
DCDQ post coordination	Highest	1	8	18.00
		2	7	17.00

Extreme Values

			Case Number	Value
		3	6	16.00
		4	10	15.00
		5	3	14.00
	Lowest	1	9	7.00
		2	4	8.00
		3	5	10.00
		4	2	10.00
		5	1	12.00
DCDQ post total	Highest	1	8	52.00
		2	3	50.00
		3	6	49.00
		4	10	49.00
		5	7	45.00
	Lowest	1	4	31.00
		2	5	34.00
		3	9	38.00
		4	2	40.00
		5	1	41.00

a. Only a partial list of cases with the value 5.00 are shown in the table of upper extremes.

b. Only a partial list of cases with the value 5.00 are shown in the table of lower extremes.

c. Only a partial list of cases with the value 9.00 are shown in the table of upper extremes.

d. Only a partial list of cases with the value 9.00 are shown in the table of lower extremes.

e. Only a partial list of cases with the value 25.00 are shown in the table of upper extremes.

f. Only a partial list of cases with the value 25.00 are shown in the table of lower extremes.

g. Only a partial list of cases with the value 50.00 are shown in the table of upper extremes.

h. Only a partial list of cases with the value 50.00 are shown in the table of lower extremes.

i. Only a partial list of cases with the value 2.80 are shown in the table of upper extremes.

j. Only a partial list of cases with the value 2.80 are shown in the table of lower extremes.

k. Only a partial list of cases with the value 2.30 are shown in the table of upper extremes.

l. Only a partial list of cases with the value 2.30 are shown in the table of lower extremes.

m. Only a partial list of cases with the value 2.70 are shown in the table of upper extremes.

n. Only a partial list of cases with the value 2.70 are shown in the table of lower extremes.

o. Only a partial list of cases with the value 3.20 are shown in the table of upper extremes.

p. Only a partial list of cases with the value 3.20 are shown in the table of lower extremes.

q. Only a partial list of cases with the value 1.60 are shown in the table of upper extremes.

r. Only a partial list of cases with the value 1.60 are shown in the table of lower extremes.

s. Only a partial list of cases with the value 4.00 are shown in the table of upper extremes.

t. Only a partial list of cases with the value 4.00 are shown in the table of lower extremes.

u. Only a partial list of cases with the value 2.00 are shown in the table of upper extremes.

v. Only a partial list of cases with the value 2.00 are shown in the table of lower extremes.

w. Only a partial list of cases with the value 1.30 are shown in the table of upper extremes.

x. Only a partial list of cases with the value 1.30 are shown in the table of lower extremes.

y. Only a partial list of cases with the value 42.00 are shown in the table of upper extremes.

z. Only a partial list of cases with the value 42.00 are shown in the table of lower extremes.

aa. Only a partial list of cases with the value 3.00 are shown in the table of upper extremes.

ab. Only a partial list of cases with the value 3.00 are shown in the table of lower extremes.

ac. Only a partial list of cases with the value 1.00 are shown in the table of upper extremes.

ad. Only a partial list of cases with the value 1.00 are shown in the table of lower extremes.

ae. Only a partial list of cases with the value 7.00 are shown in the table of upper extremes.

af. Only a partial list of cases with the value 7.00 are shown in the table of lower extremes.

ag. Only a partial list of cases with the value 6.00 are shown in the table of upper extremes.

ah. Only a partial list of cases with the value 6.00 are shown in the table of lower extremes.

ai. Only a partial list of cases with the value 15.00 are shown in the table of upper extremes.

aj. Only a partial list of cases with the value 15.00 are shown in the table of lower extremes.

ak. Only a partial list of cases with the value 11.00 are shown in the table of upper extremes.

al. Only a partial list of cases with the value 11.00 are shown in the table of lower extremes.

am. Only a partial list of cases with the value 20.00 are shown in the table of upper extremes.

an. Only a partial list of cases with the value 20.00 are shown in the table of lower extremes.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age in months	.188	10	.200*	.898	10	.206
Social Communication Questionnaire	.169	10	.200*	.954	10	.717
MABC2pre manual dexterity	.236	10	.120	.843	10	.048
MABC2pre aiming and catching	.303	10	.010	.822	10	.027
MABC2pre balance	.163	10	.200*	.903	10	.239
MABC2pre total	.194	10	.200*	.851	10	.059
MABC2post manual dexterity	.255	10	.064	.836	10	.039
MABC2post aiming and catching	.224	10	.170	.885	10	.148
MABC2post balance	.170	10	.200*	.919	10	.346
MABC2post total	.167	10	.200*	.903	10	.237
SPP pupil pre scholastic competence	.133	10	.200*	.976	10	.941
SPP pupil pre social competence	.167	10	.200*	.967	10	.862
SPP pupil pre athletic competence	.185	10	.200*	.927	10	.417
SPP pupil pre physical apprearance	.196	10	.200*	.958	10	.758
SPP pupil pre behavioural conduct	.183	10	.200*	.919	10	.350
SPP pupil pre global self worth	.161	10	.200*	.953	10	.700
SPP pupil post scholastic competence	.176	10	.200*	.926	10	.412
SPP pupil post social competence	.209	10	.200*	.901	10	.226
SPP pupil post athletic competence	.311	10	.007	.847	10	.053
SPP pupil post physical appearance	.175	10	.200*	.936	10	.506
SPP pupil post behavioural conduct	.206	10	.200*	.850	10	.058

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Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SPP pupil post global self worth	.173	10	.200*	.943	10	.584
SPP parent pre scholastic competence	.211	10	.200*	.907	10	.263
SPP parent pre social competence	.269	10	.039	.779	10	.008
SPP parent pre athletic competence	.225	10	.165	.886	10	.153
SPP parent pre physical appreance	.433	10	.000	.594	10	.000
SPP parent pre behavioural conduct	.200	10	.200*	.887	10	.158
SPP parent post scholastic competence	.218	10	.194	.903	10	.239
SPP parent post social acceptance	.298	10	.012	.840	10	.044
SPP parent post athletic competence	.287	10	.019	.838	10	.042
SPP parent post physical apprearance	.466	10	.000	.516	10	.000
SPP parent post behavioural conduct	.179	10	.200*	.858	10	.072
SSQ pupil pre	.175	10	.200*	.939	10	.543
SSQ pupil post	.212	10	.200*	.949	10	.652
SSQ teacher pre	.234	10	.127	.925	10	.403
SSQ teacher post	.148	10	.200*	.972	10	.910
SSQ parent pre	.135	10	.200*	.957	10	.749
SSQ parent post	.143	10	.200*	.963	10	.822
SF pre attention	.174	10	.200*	.952	10	.691
SF pre concentration	.231	10	.139	.924	10	.392
SF pre completion rate	.286	10	.020	.885	10	.149
SF pre handwriting	.231	10	.139	.924	10	.392
SF post attention	.303	10	.010	.819	10	.025
SF post concentration	.226	10	.159	.864	10	.085
SF post completion rate	.230	10	.143	.933	10	.479
SF post handwriting	.189	10	.200*	.940	10	.550
SDQ teacher pre emotional	.166	10	.200*	.915	10	.321
SDQ teacher pre conduct	.245	10	.091	.811	10	.020
SDQ teacher pre hyperactivity	.175	10	.200*	.926	10	.413
SDQ teacher pre peer relationship	.182	10	.200*	.931	10	.462

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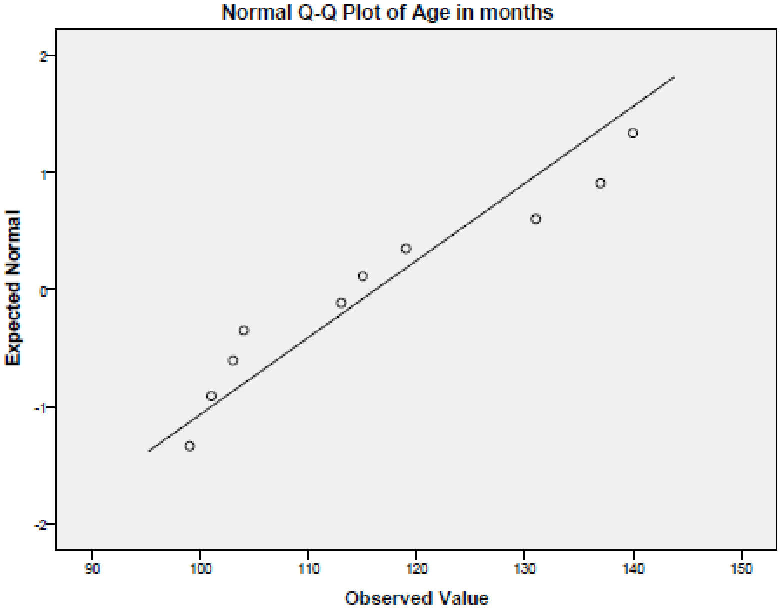
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SDQ teacher pre prosocial behaviour	.170	10	.200*	.937	10	.516
SDQ teacher pre total	.123	10	.200*	.974	10	.925
SDQ teacher post emotional	.215	10	.200*	.945	10	.608
SDQ teacher post conduct	.181	10	.200*	.870	10	.099
SDQ teacher post hyperactivity	.208	10	.200*	.892	10	.178
SDQ teacher post peer relationship	.186	10	.200*	.930	10	.450
SDQ teacher post prosocial	.184	10	.200*	.908	10	.264
SDQ teacher post total	.158	10	.200*	.947	10	.639
SDQ parent pre emotional	.266	10	.044	.863	10	.083
SDQ parent pre conduct	.192	10	.200*	.872	10	.106
SDQ parent pre hyperactivity	.182	10	.200*	.931	10	.462
SDQ parent pre peer relationship	.219	10	.190	.908	10	.270
SDQ parent pre prosocial	.238	10	.114	.867	10	.092
SDQ parent pre total	.170	10	.200*	.951	10	.683
SDQ parent post emotional	.167	10	.200*	.959	10	.777
SDQ parent post conduct	.233	10	.132	.899	10	.214
SDQ parent post hyperactivity	.168	10	.200*	.908	10	.268
SDQ parent post peer relationship	.196	10	.200*	.895	10	.191
SDQ parent post prosocial	.197	10	.200*	.869	10	.098
SDQ parent post total	.269	10	.039	.865	10	.087
DCDQ pre control movement	.372	10	.000	.638	10	.000
DCDQ pre handwriting	.191	10	.200*	.916	10	.327
DCDQ pre coordination	.135	10	.200*	.961	10	.799
DCDQ pre total	.194	10	.200*	.911	10	.286
DCDQ post control movement	.253	10	.070	.913	10	.305
DCDQ post handwriting	.150	10	.200*	.941	10	.560
DCDQ post coordination	.158	10	.200*	.944	10	.599
DCDQ post total	.201	10	.200*	.935	10	.495

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Age in months



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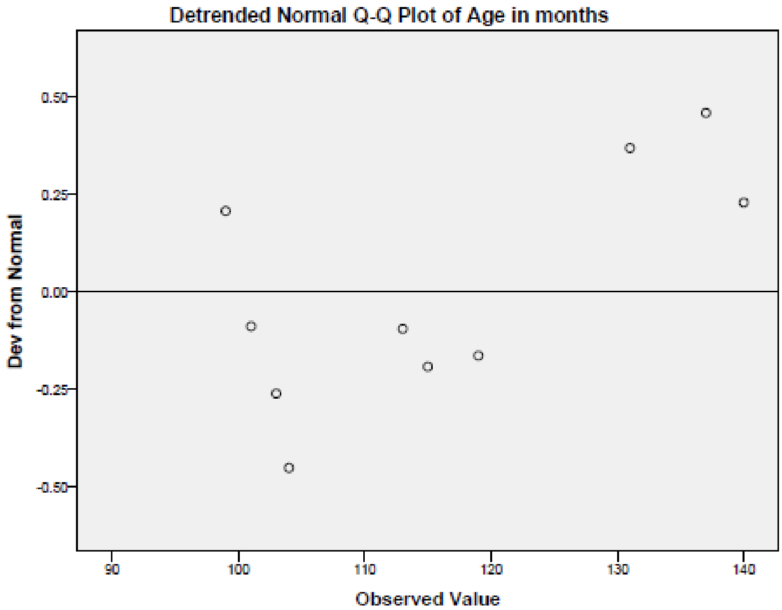
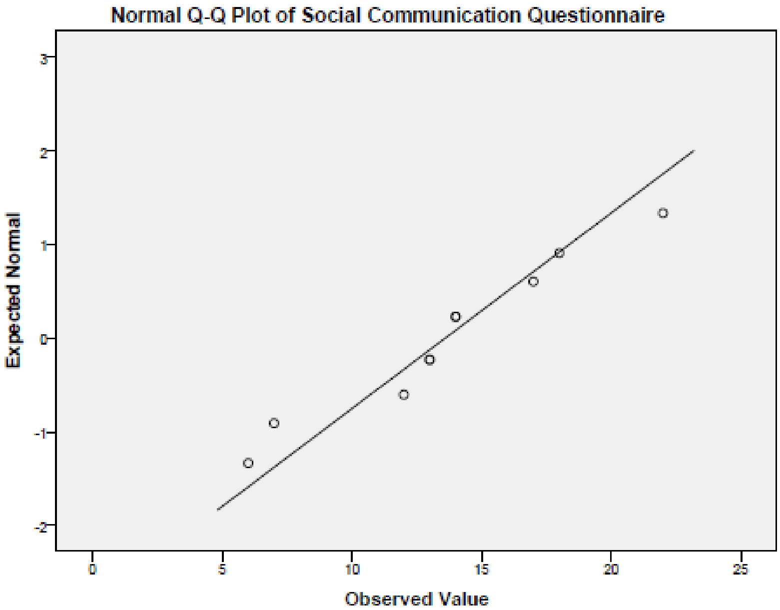
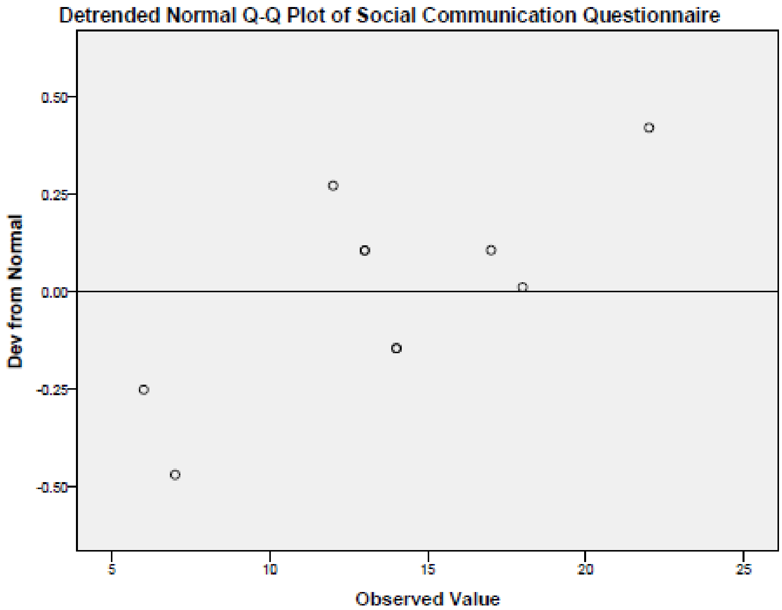


Social Communication Questionnaire


Normal Q-Q Plot of Social Communication Questionnaire
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
5
10
15
20
25



MABC2pre manual dexterity

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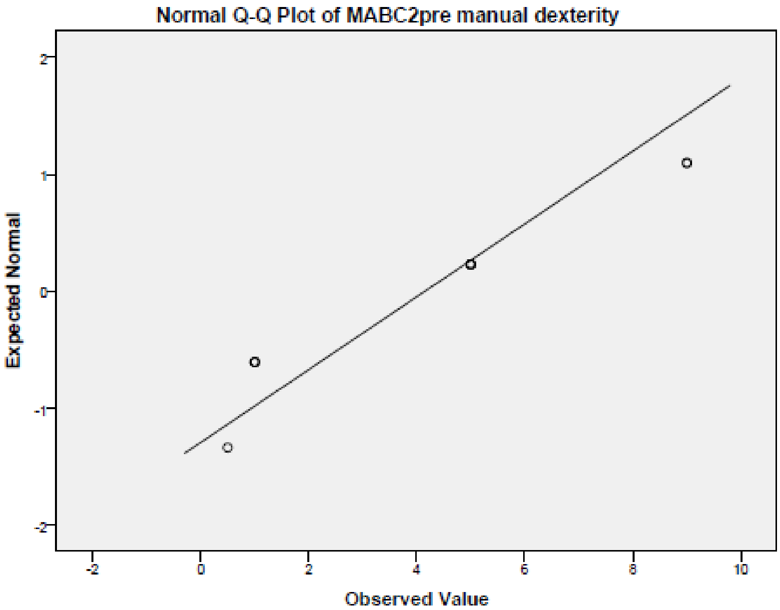
Normal Q-Q Plot of MABC2pre manual dexterity
Expected Normal
Observed Value
2
1
0
-1
-2
-2
0
2
4
6
8
10

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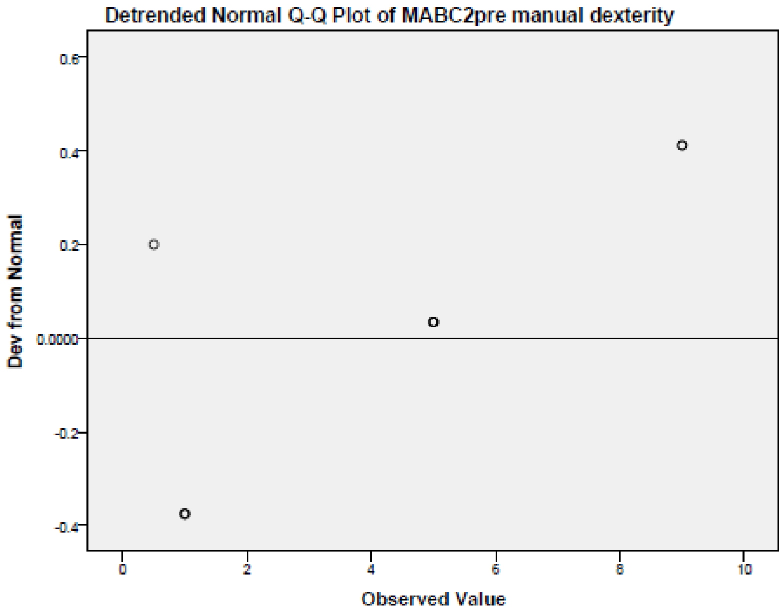
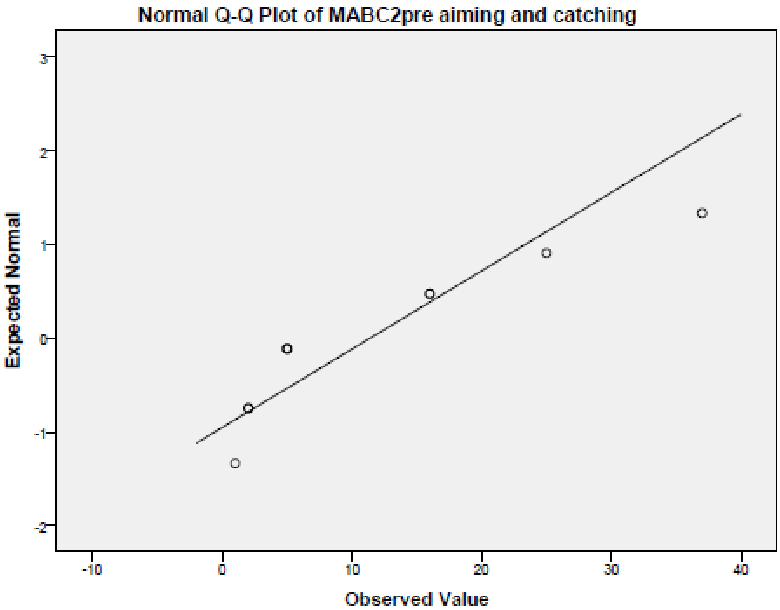


MABC2pre aiming and catching

Page 158


Normal Q-Q Plot of MABC2pre aiming and catching
Expected Normal
Observed Value
3
2
1
0
-1
-2
-10
0
10
20
30
40

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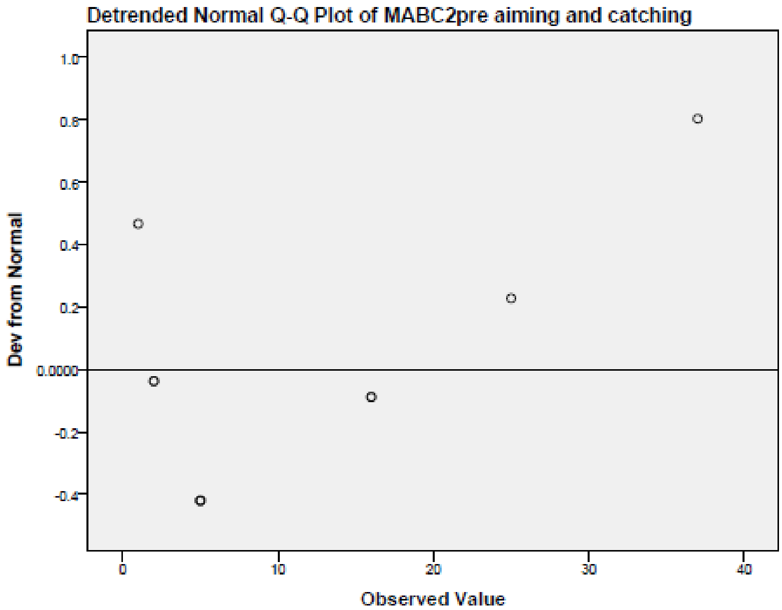

MABC2pre balance

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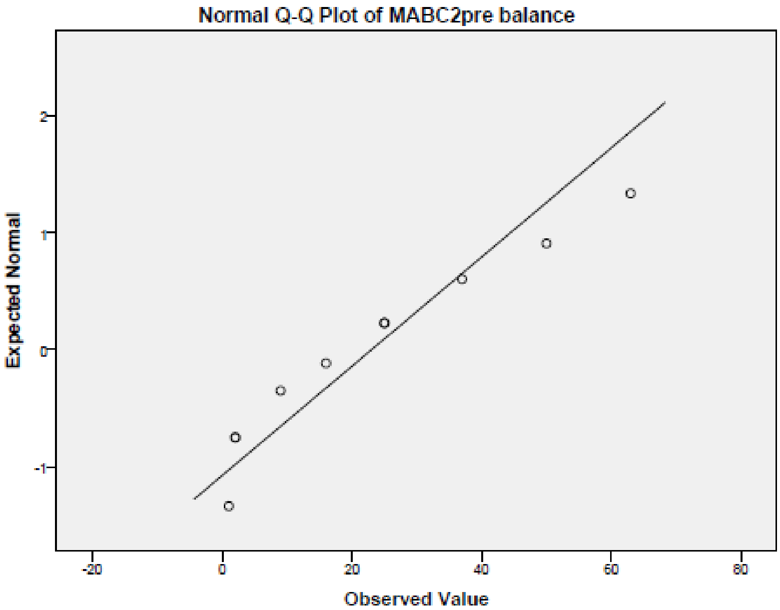
Normal Q-Q Plot of MABC2pre balance
Expected Normal
Observed Value
2
1
0
-1
-20
0
20
40
60
80

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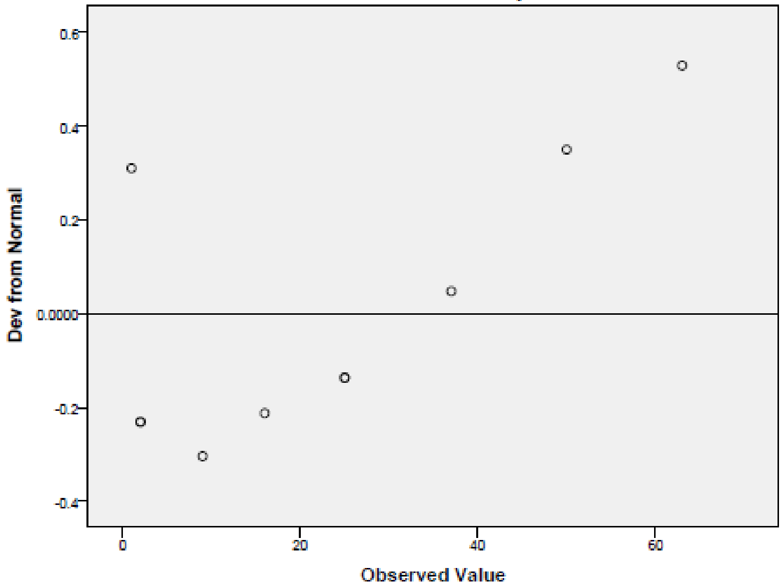
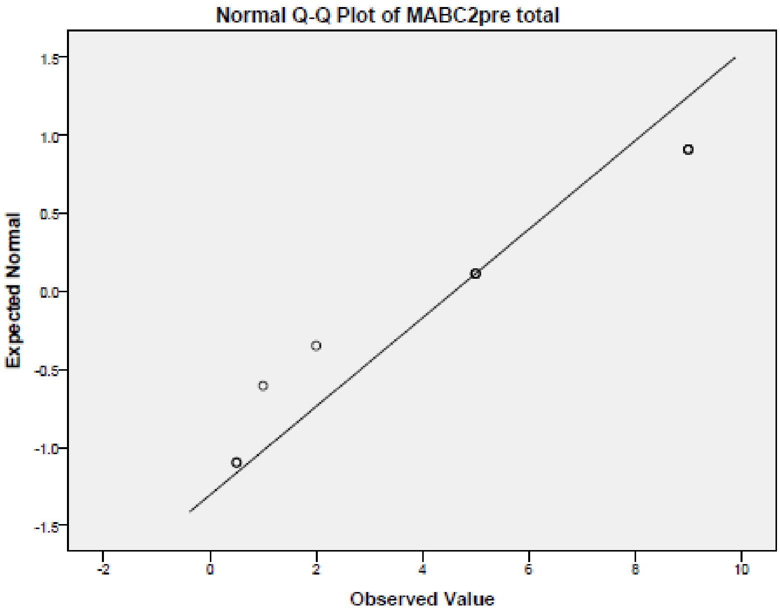
Detrended Normal Q-Q Plot of MABC2pre balance



MABC2pre total


Normal Q-Q Plot of MABC2pre total
Expected Normal
Observed Value
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2
0
2
4
6
8
10

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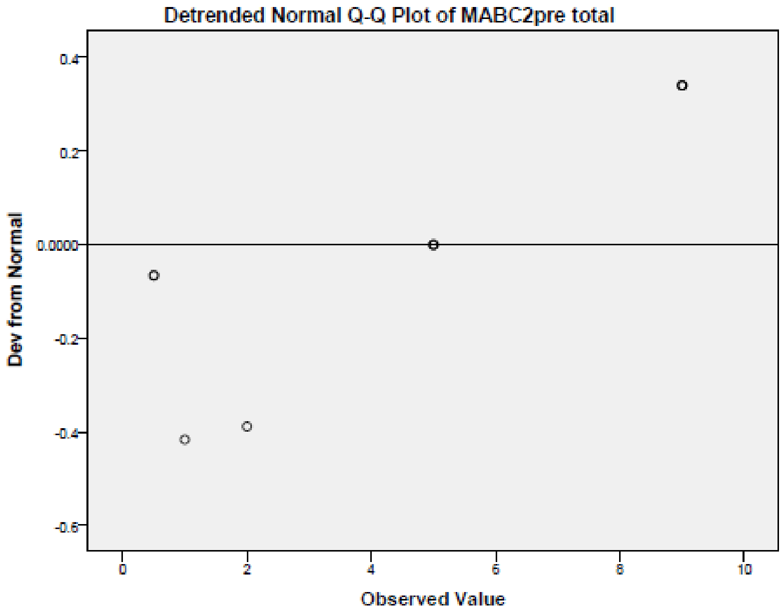

MABC2post manual dexterity

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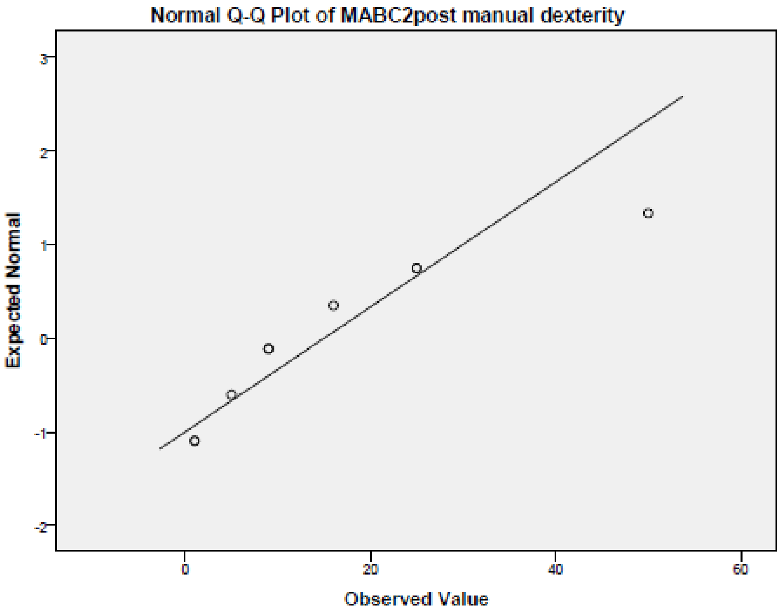
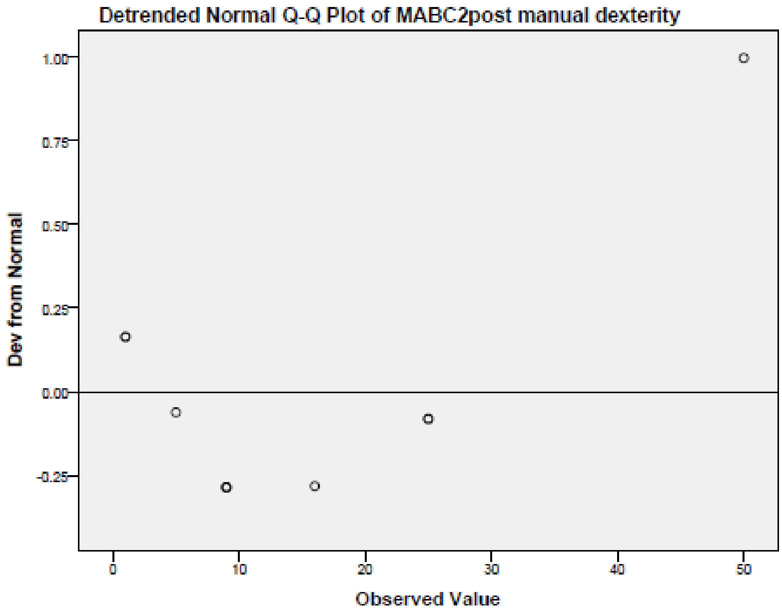
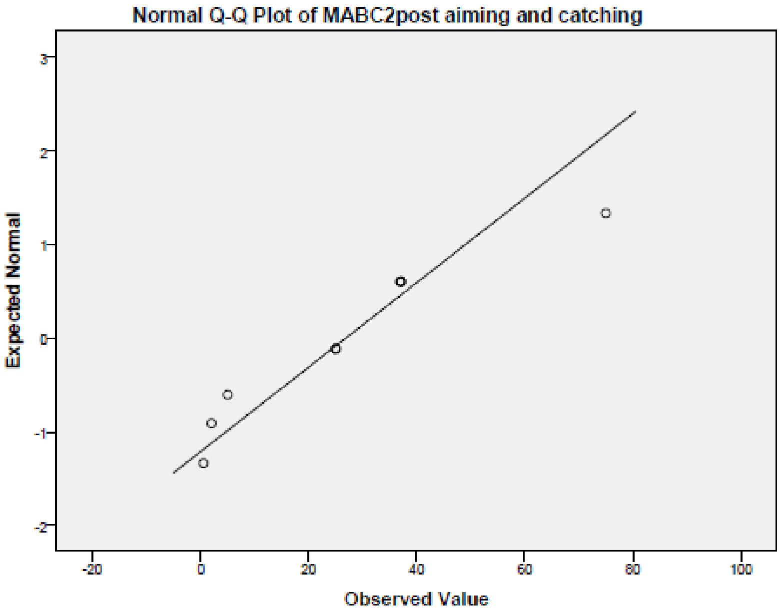

Normal Q-Q Plot of MABC2post manual dexterity
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
20
40
60



MABC2post aiming and catching


Normal Q-Q Plot of MABC2post aiming and catching
Expected Normal
3
2
1
0
-1
-2
-20
0
20
40
60
80
100
Observed Value

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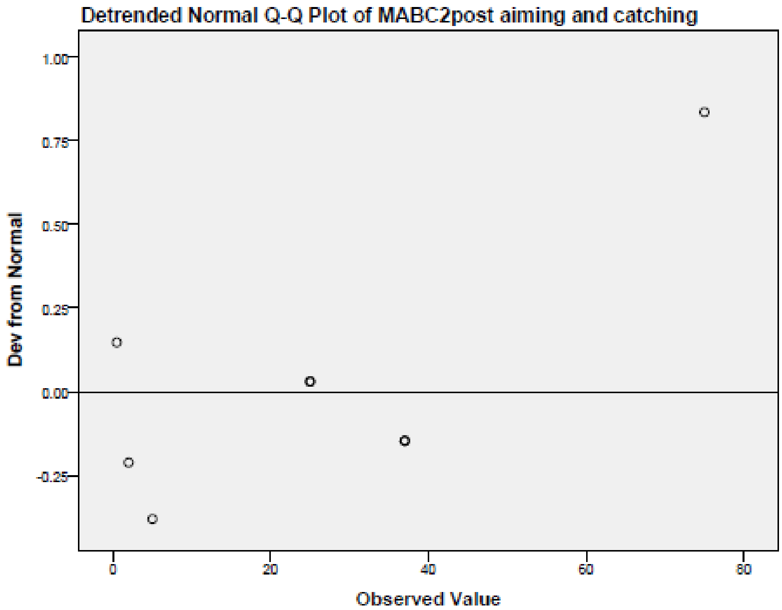

MABC2post balance

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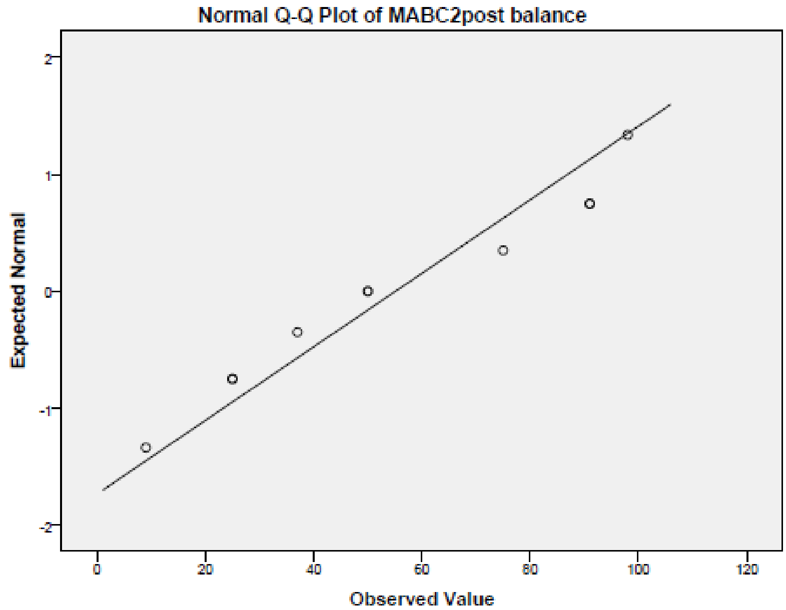
Normal Q-Q Plot of MABC2post balance
Expected Normal
2
1
0
-1
-2
0
20
40
60
80
100
120
Observed Value

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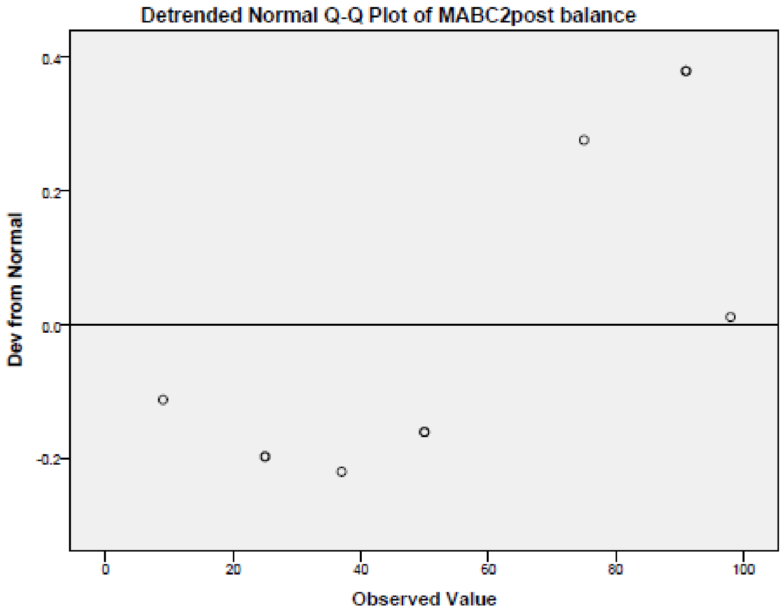

MABC2post total

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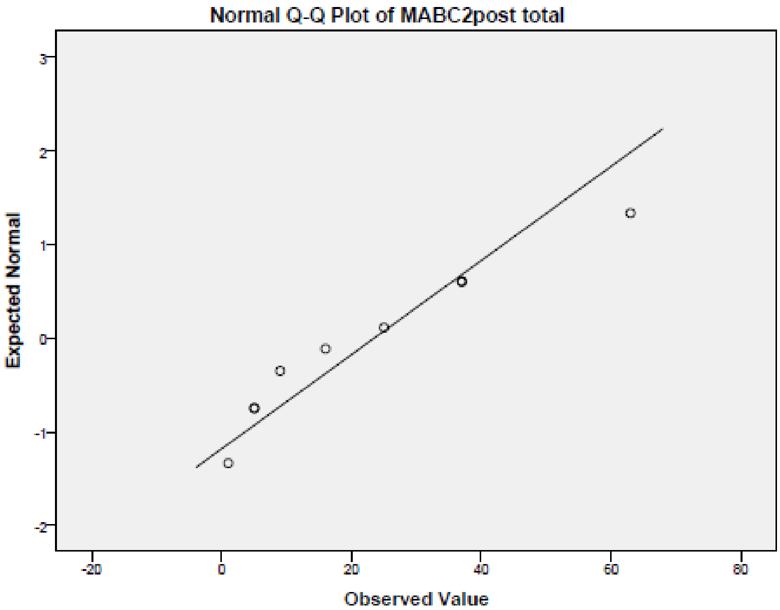
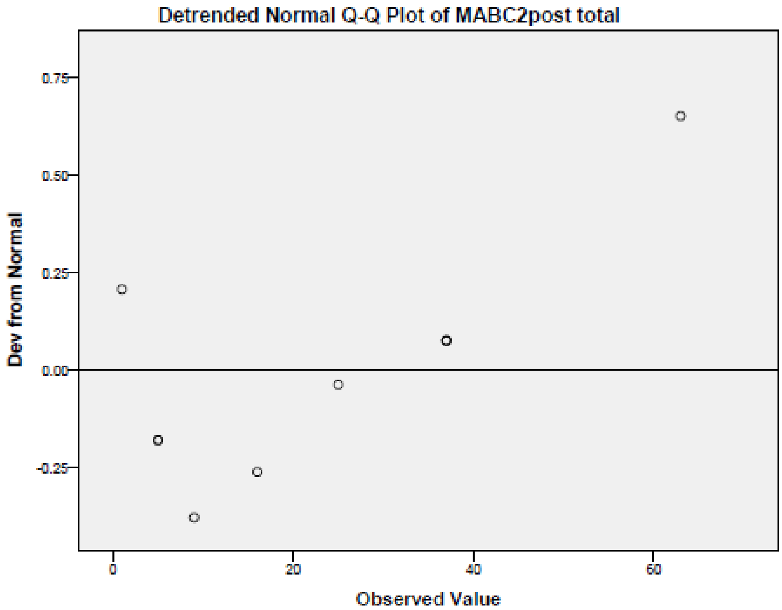

Normal Q-Q Plot of MABC2post total
Expected Normal
Observed Value
3
2
1
0
-1
-2
-20
0
20
40
60
80



SPP pupil pre scholastic competence

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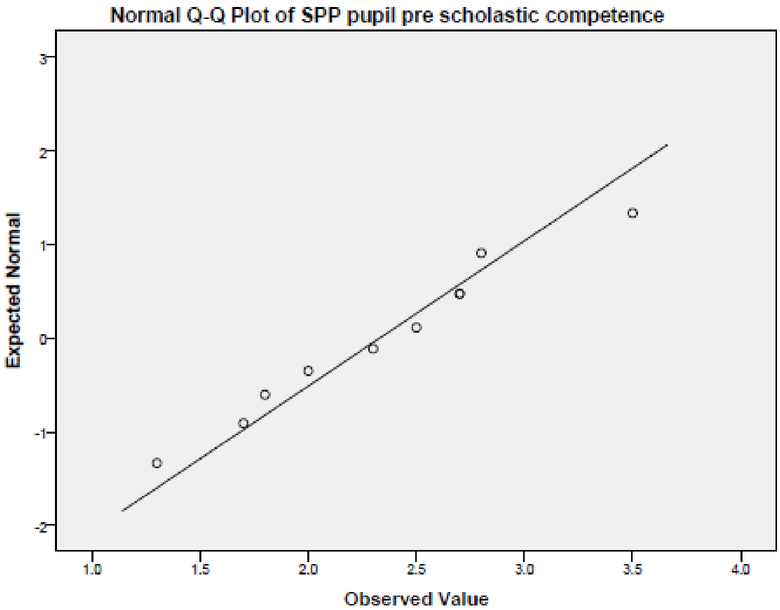
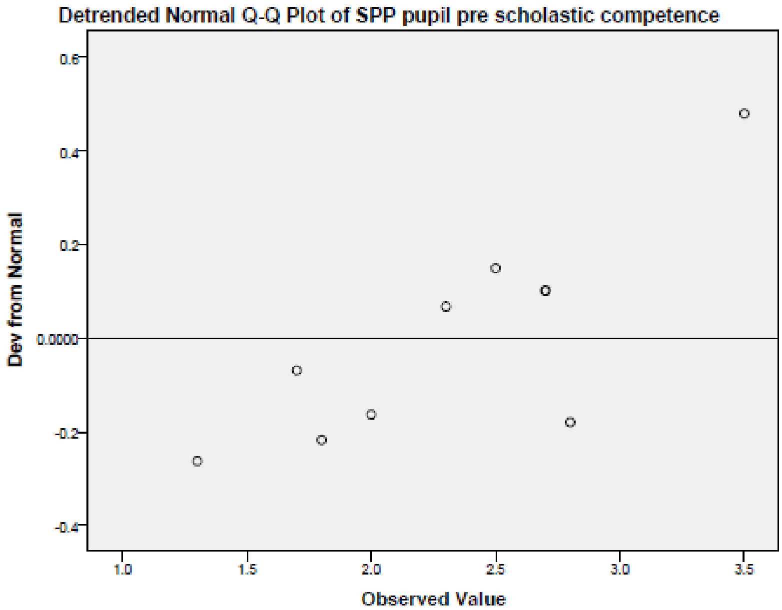

Normal Q-Q Plot of SPP pupil pre scholastic competence
Expected Normal
Observed Value
3
2
1
0
-1
-2
1.0
1.5
2.0
2.5
3.0
3.5
4.0



SPP pupil pre social competence

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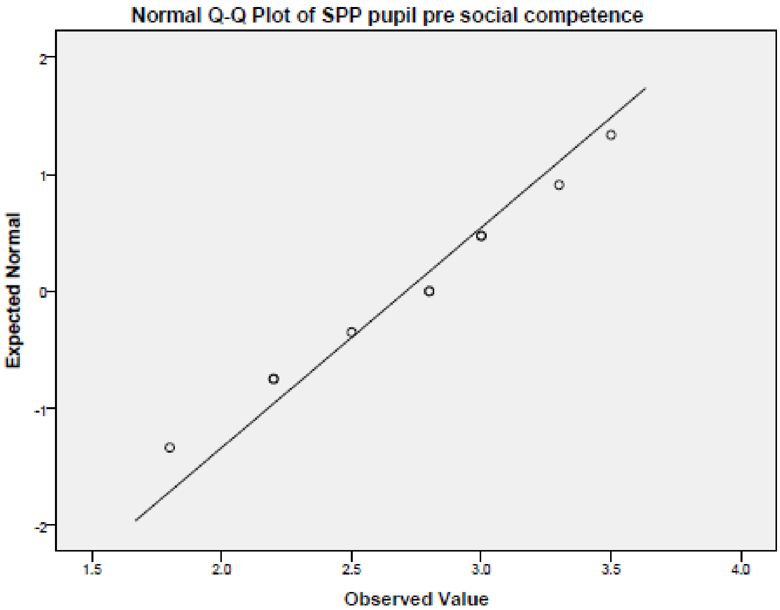
Normal Q-Q Plot of SPP pupil pre social competence
Expected Normal
Observed Value
2
1
0
-1
-2
1.5
2.0
2.5
3.0
3.5
4.0

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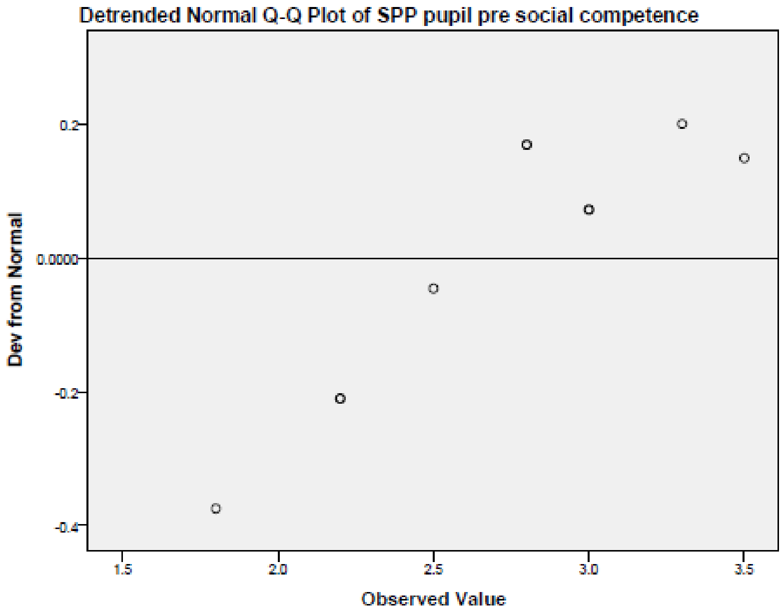
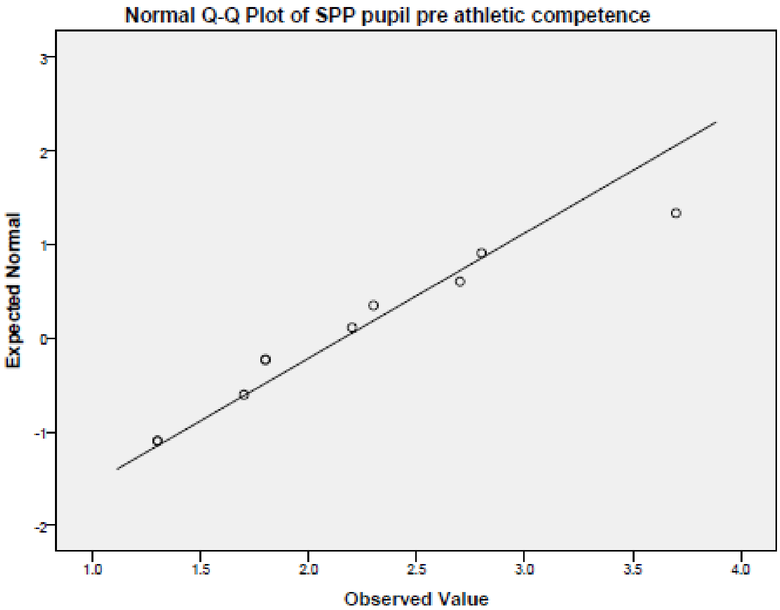
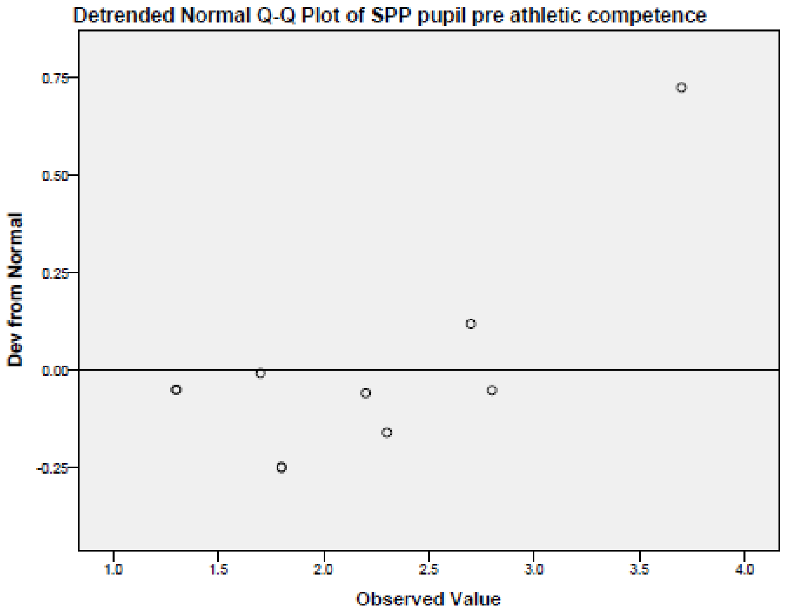
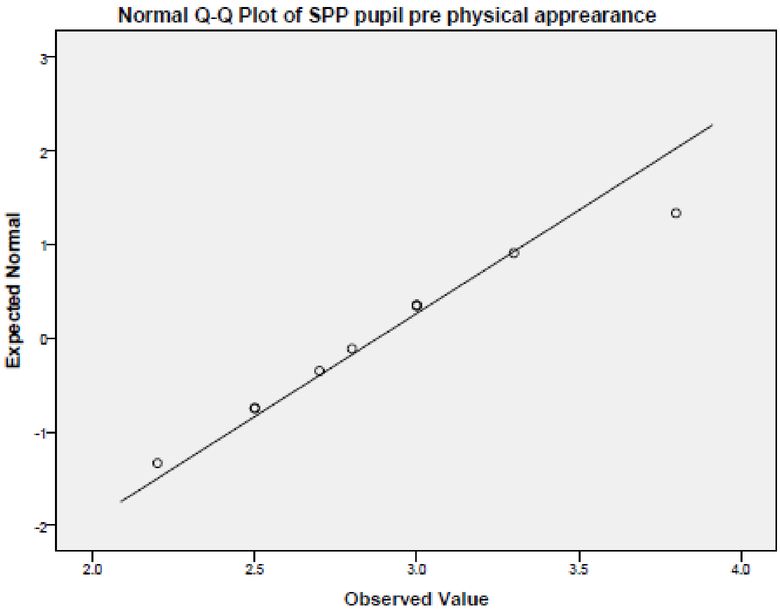


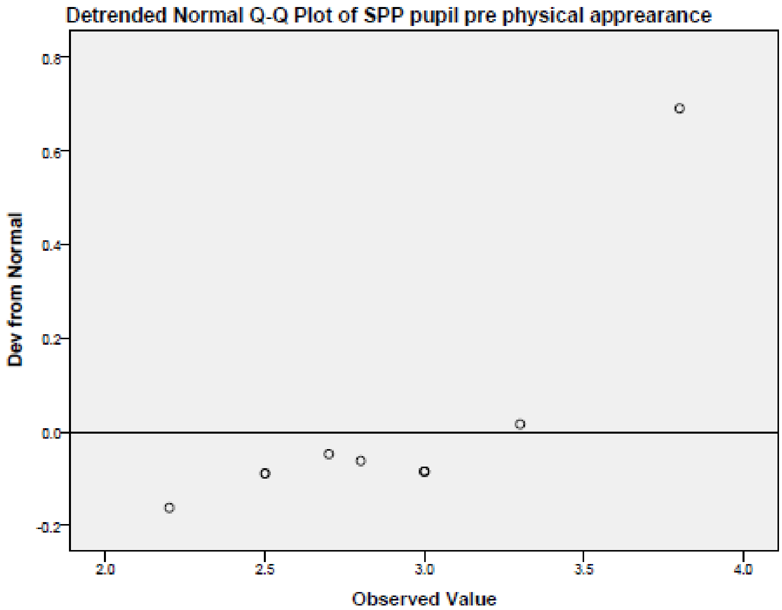
SPP pupil pre athletic competence


Normal Q-Q Plot of SPP pupil pre athletic competence
Expected Normal
Observed Value
3
2
1
0
-1
-2
1.0
1.5
2.0
2.5
3.0
3.5
4.0

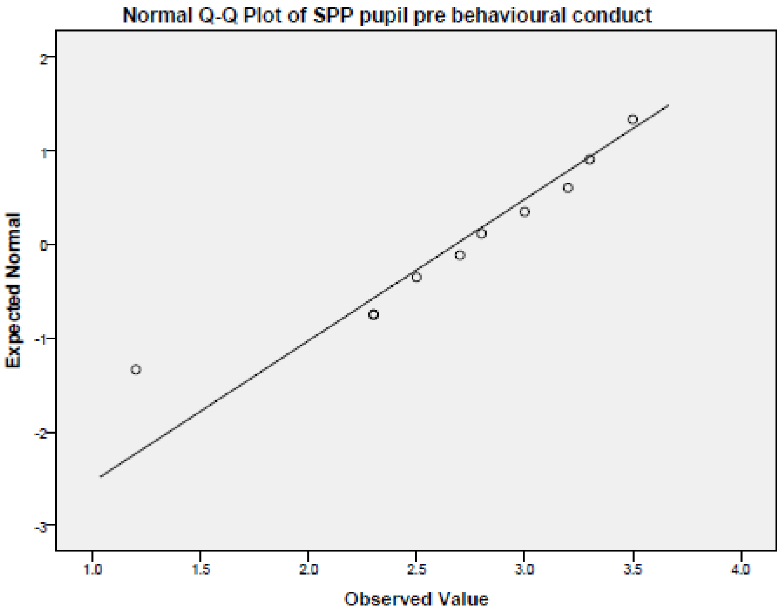


SPP pupil pre physical apprearance


Normal Q-Q Plot of SPP pupil pre physical apprearance
Expected Normal
Observed Value
3
2
1
0
-1
-2
2.0
2.5
3.0
3.5
4.0



SPP pupil pre behavioural conduct


Normal Q-Q Plot of SPP pupil pre behavioural conduct
Expected Normal
Observed Value
2
1
0
-1
-2
-3
1.0
1.5
2.0
2.5
3.0
3.5
4.0

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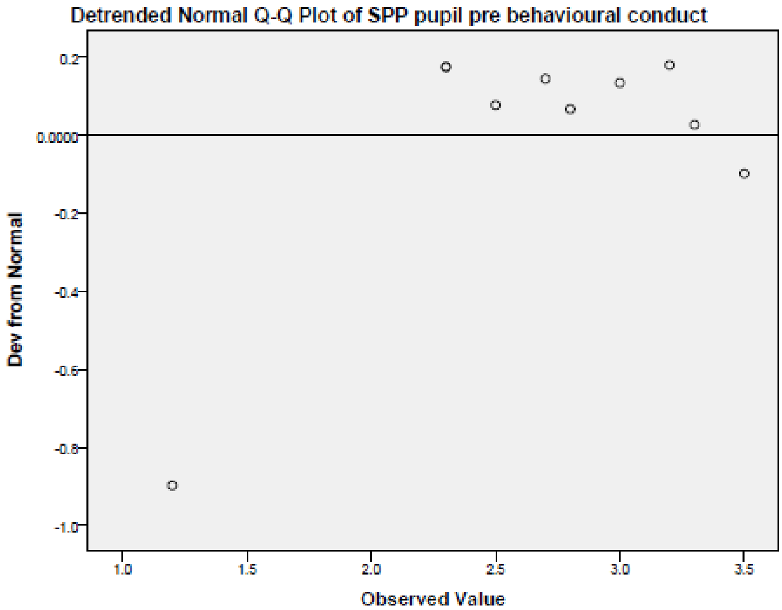
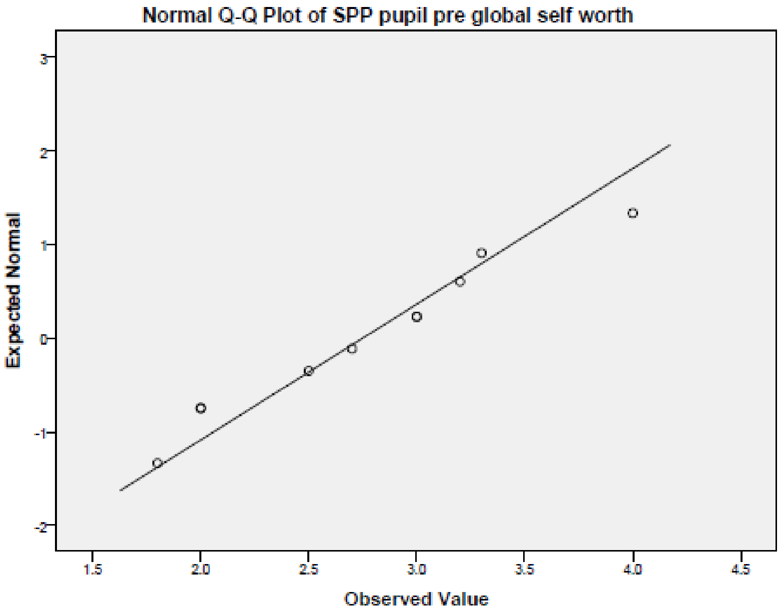


SPP pupil pre global self worth


Normal Q-Q Plot of SPP pupil pre global self worth
Expected Normal
3
2
1
0
-1
-2
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Observed Value

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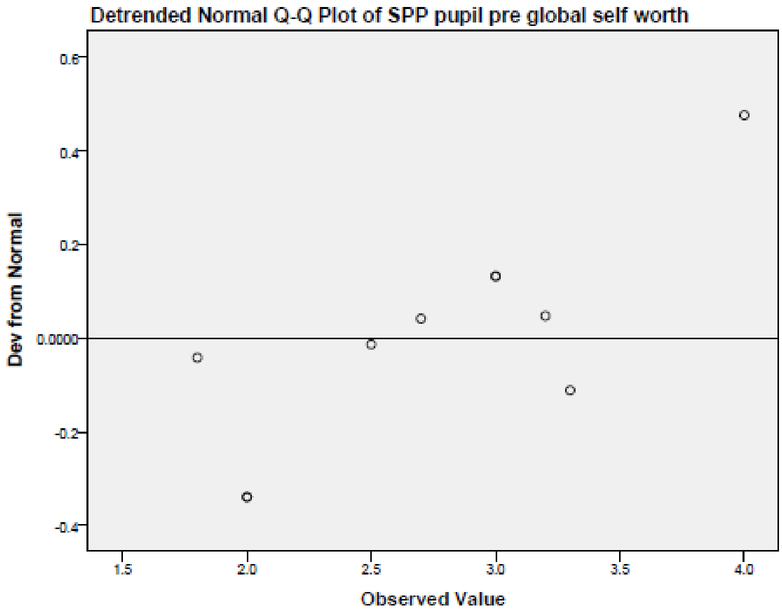
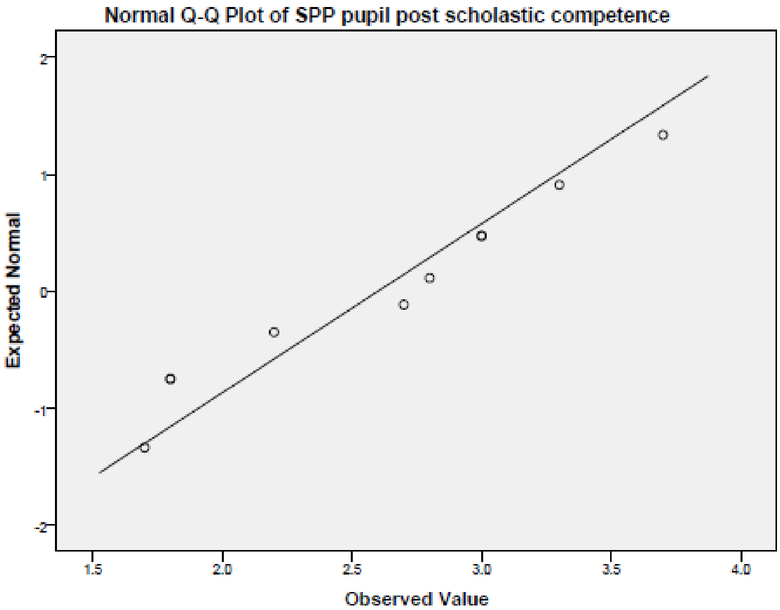
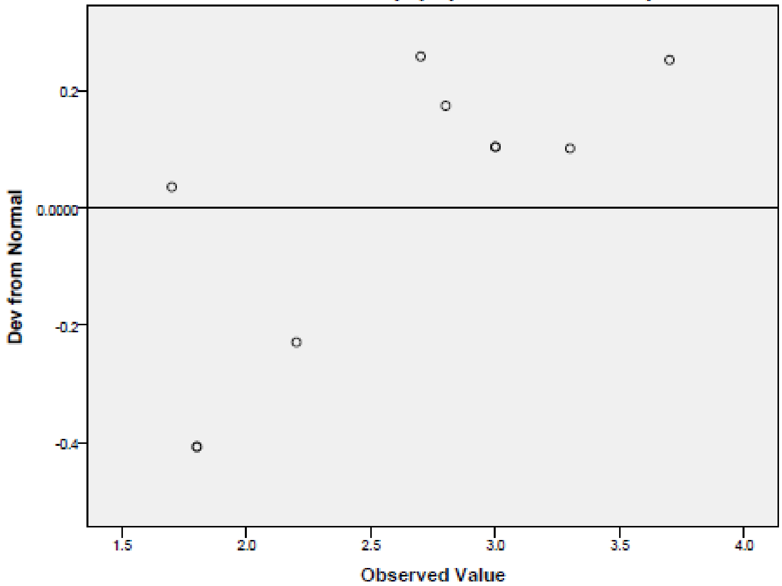


SPP pupil post scholastic competence


Normal Q-Q Plot of SPP pupil post scholastic competence
Expected Normal
Observed Value
2
1
0
-1
-2
1.5
2.0
2.5
3.0
3.5
4.0

Detrended Normal Q-Q Plot of SPP pupil post scholastic competence



SPP pupil post social competence

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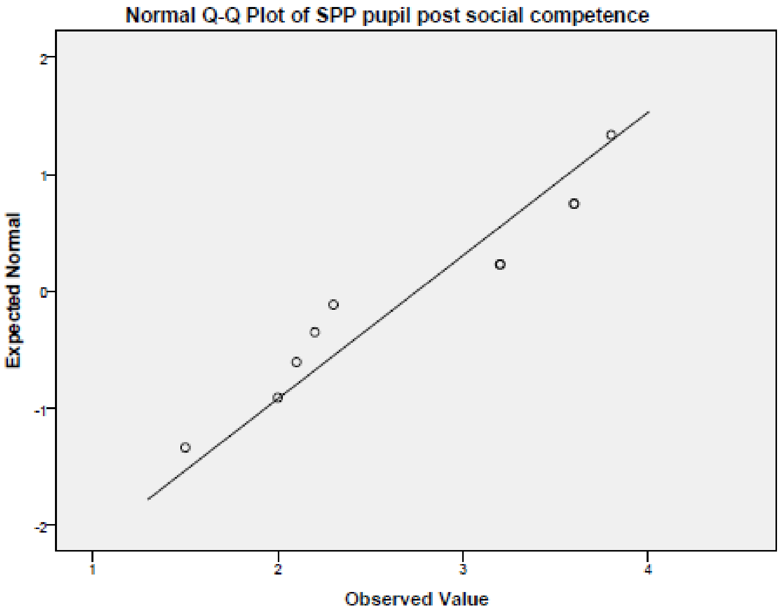
Normal Q-Q Plot of SPP pupil post social competence
Expected Normal
Observed Value
2
1
0
-1
-2
1
2
3
4

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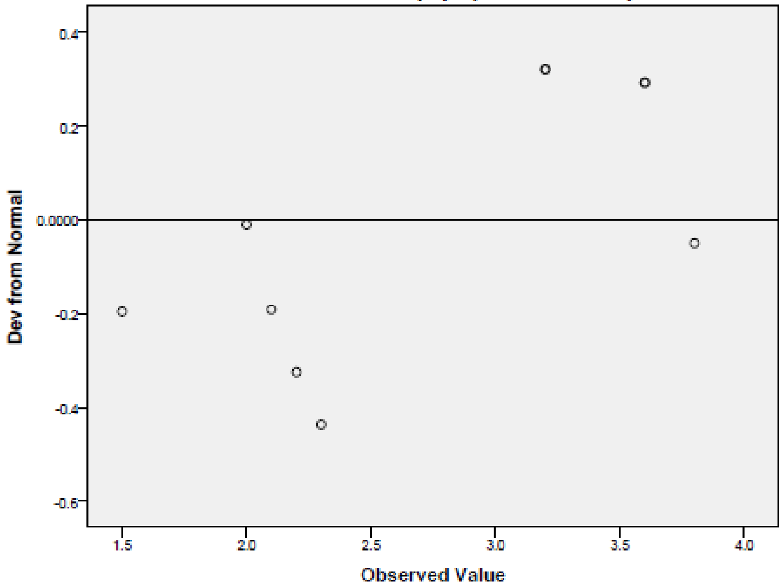
Detrended Normal Q-Q Plot of SPP pupil post social competence



SPP pupil post athletic competence

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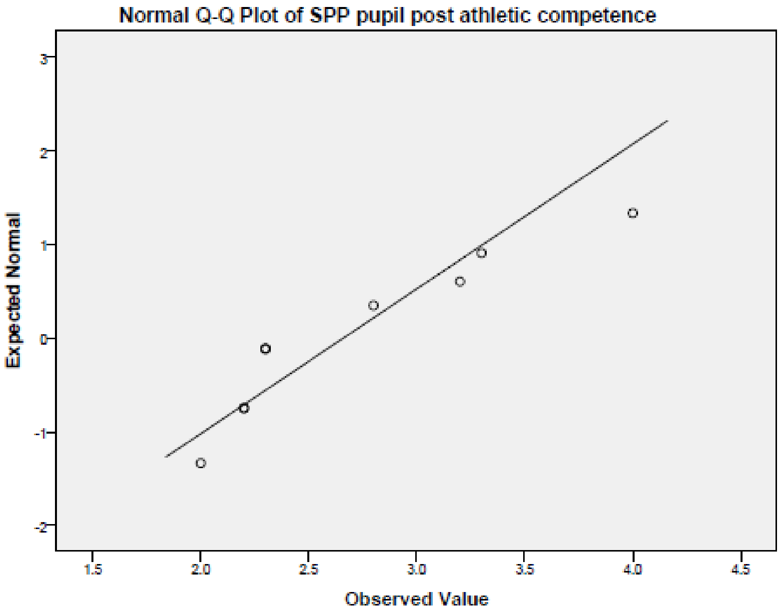
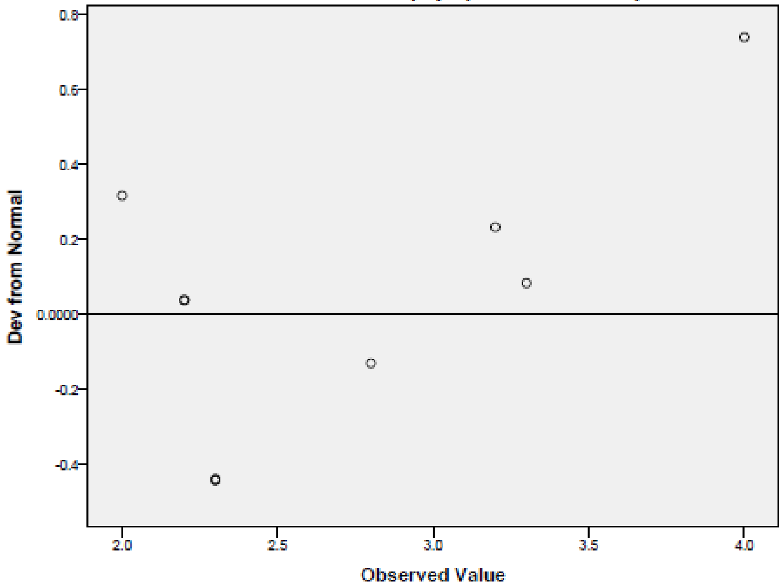
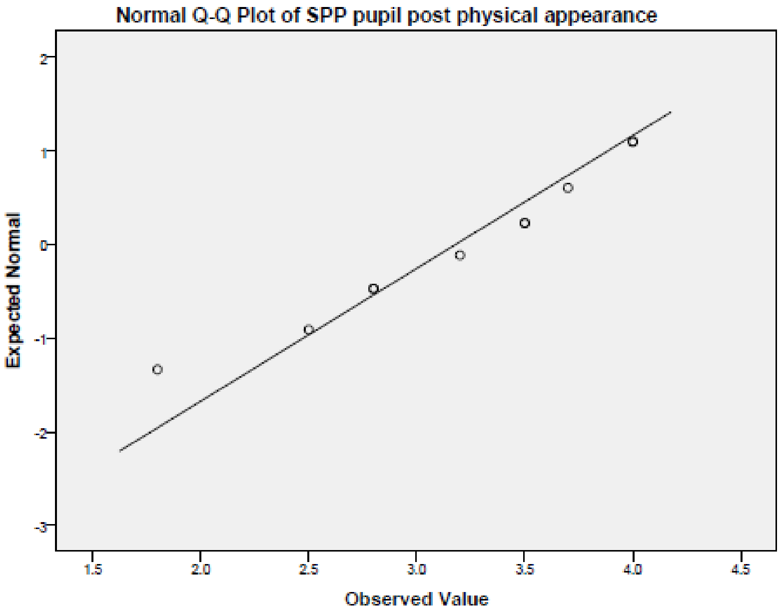
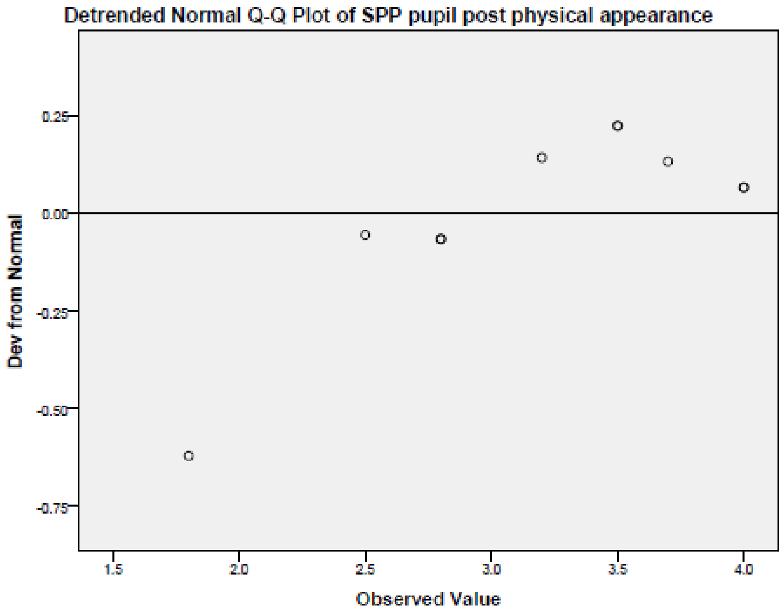

Normal Q-Q Plot of SPP pupil post athletic competence
Expected Normal
3
2
1
0
-1
-2
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Observed Value

Detrended Normal Q-Q Plot of SPP pupil post athletic competence



SPP pupil post physical appearance


Normal Q-Q Plot of SPP pupil post physical appearance
Expected Normal
Observed Value
2
1
0
-1
-2
-3
1.5
2.0
2.5
3.0
3.5
4.0
4.5



SPP pupil post behavioural conduct

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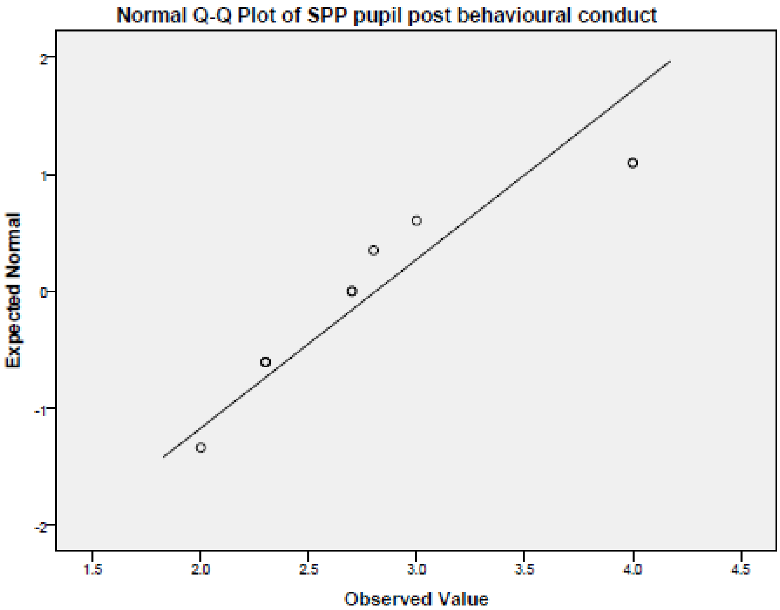
Normal Q-Q Plot of SPP pupil post behavioural conduct
Expected Normal
Observed Value
2
1
0
-1
-2
1.5
2.0
2.5
3.0
3.5
4.0
4.5

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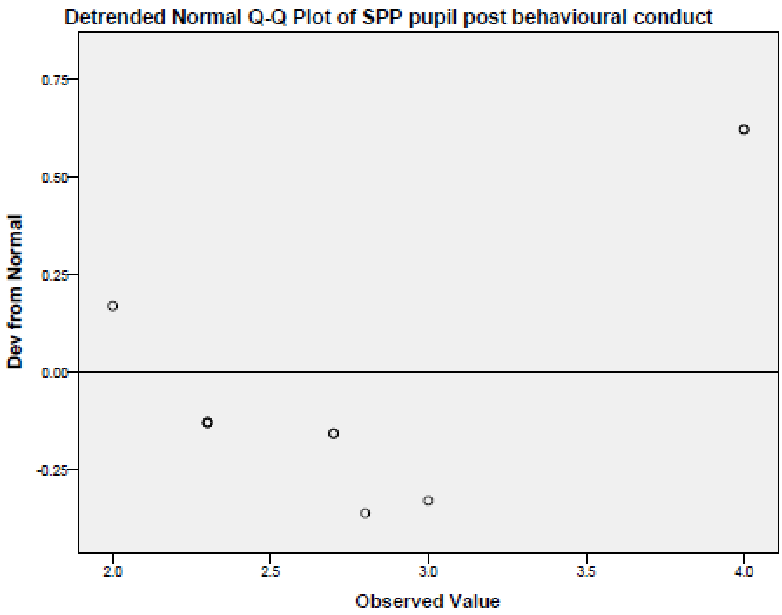
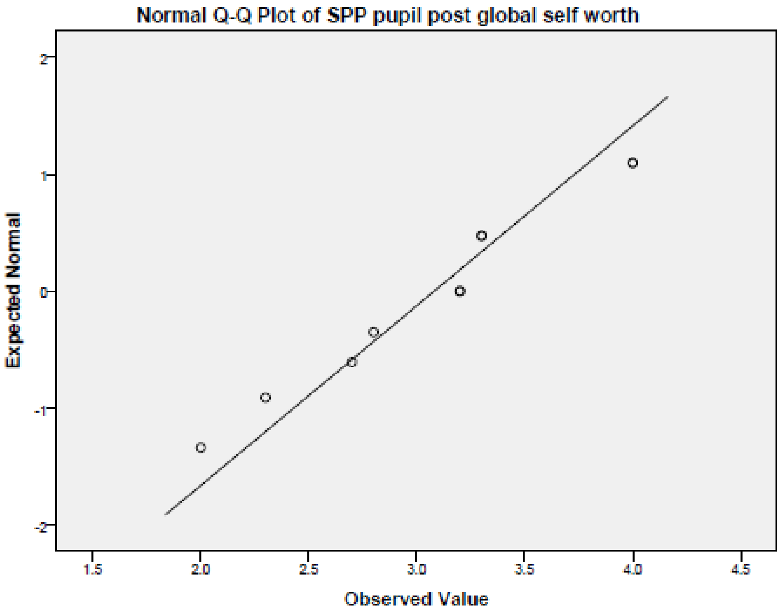
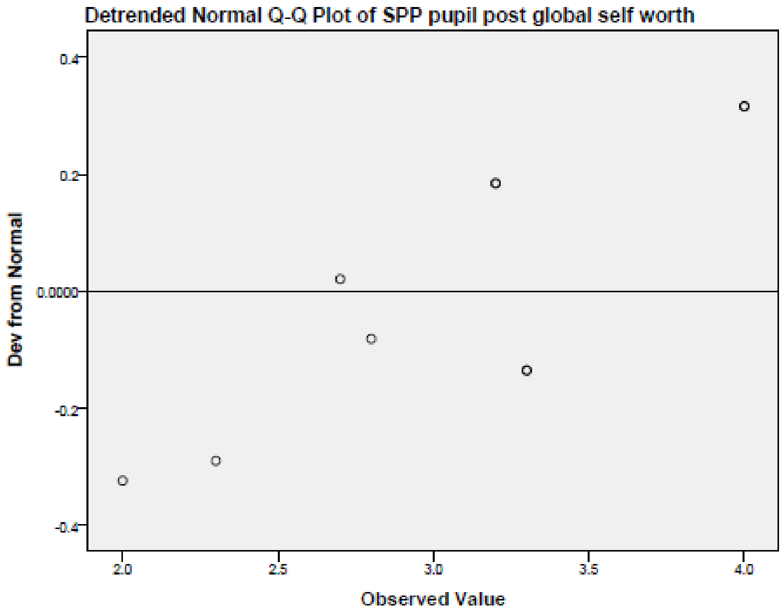
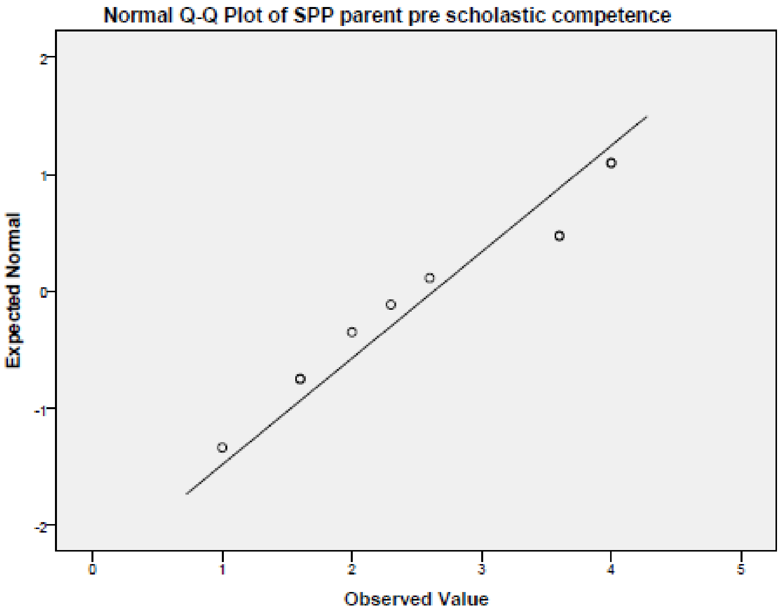


SPP pupil post global self worth


Normal Q-Q Plot of SPP pupil post global self worth
Expected Normal
2
1
0
-1
-2
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Observed Value



SPP parent pre scholastic competence


Normal Q-Q Plot of SPP parent pre scholastic competence
Expected Normal
2
1
0
-1
-2
0
1
2
3
4
5
Observed Value

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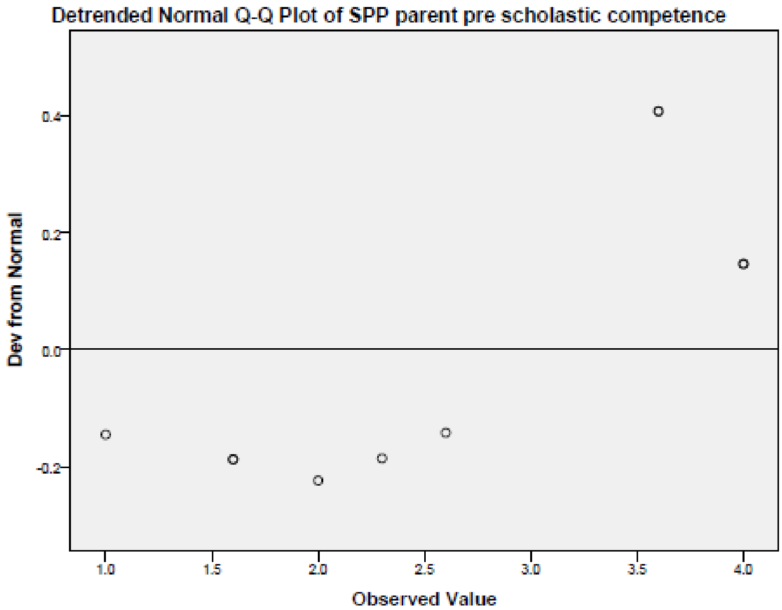
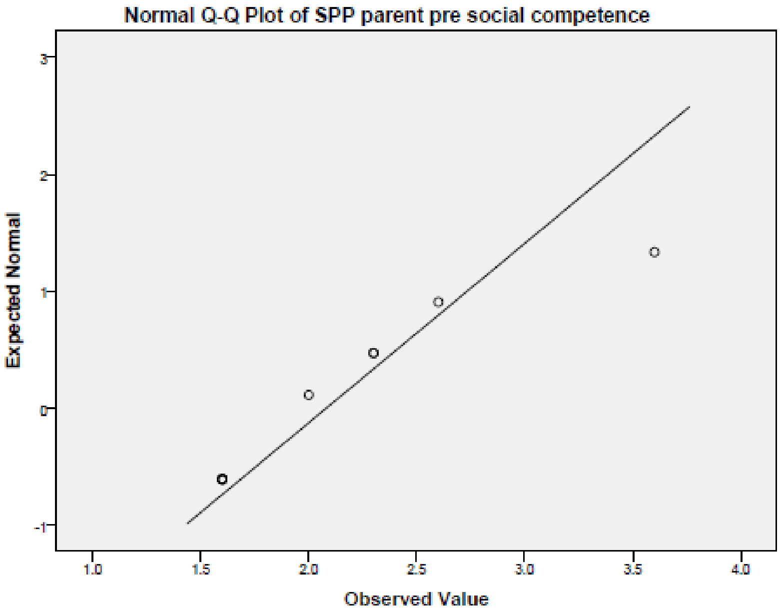


SPP parent pre social competence


Normal Q-Q Plot of SPP parent pre social competence
Expected Normal
Observed Value
3
2
1
0
-1
1.0
1.5
2.0
2.5
3.0
3.5
4.0

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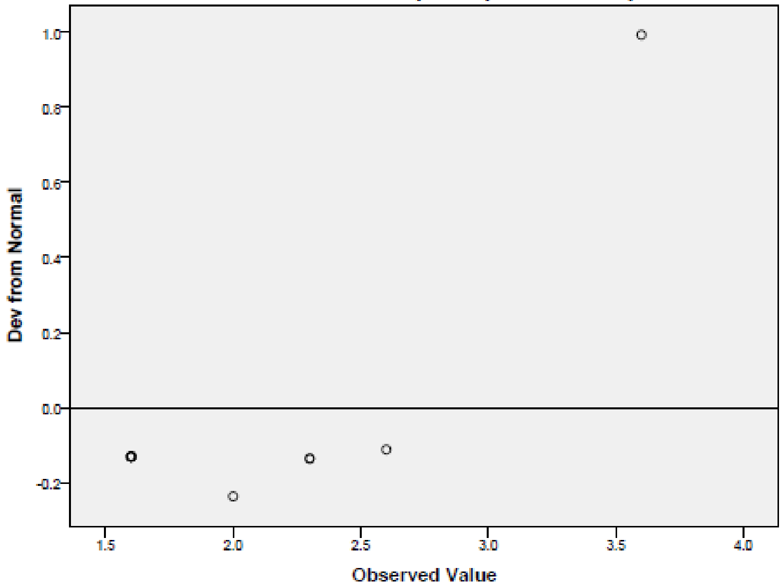
Detrended Normal Q-Q Plot of SPP parent pre social competence



SPP parent pre athletic competence

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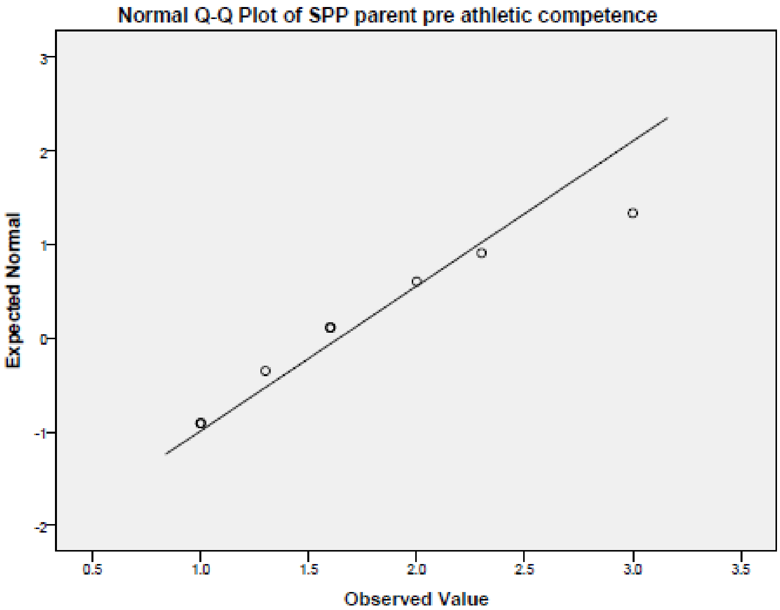
Normal Q-Q Plot of SPP parent pre athletic competence
Expected Normal
Observed Value
3
2
1
0
-1
-2
0.5
1.0
1.5
2.0
2.5
3.0
3.5

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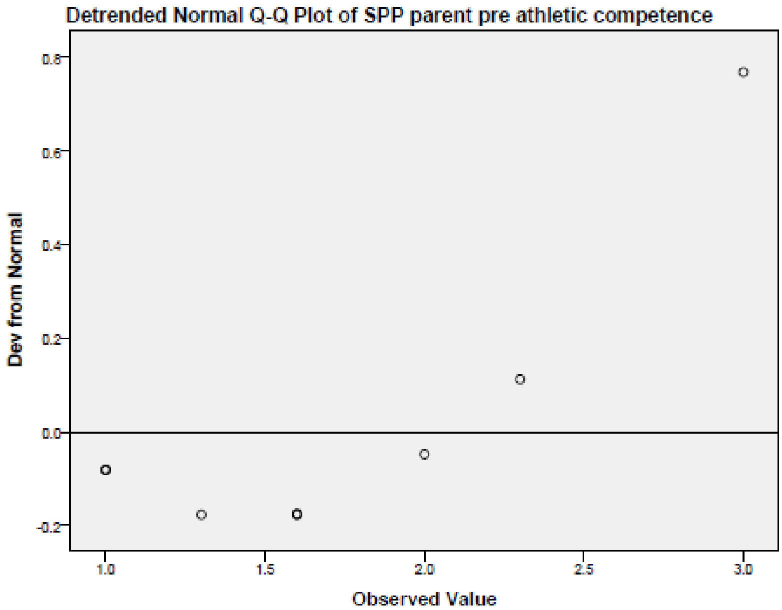
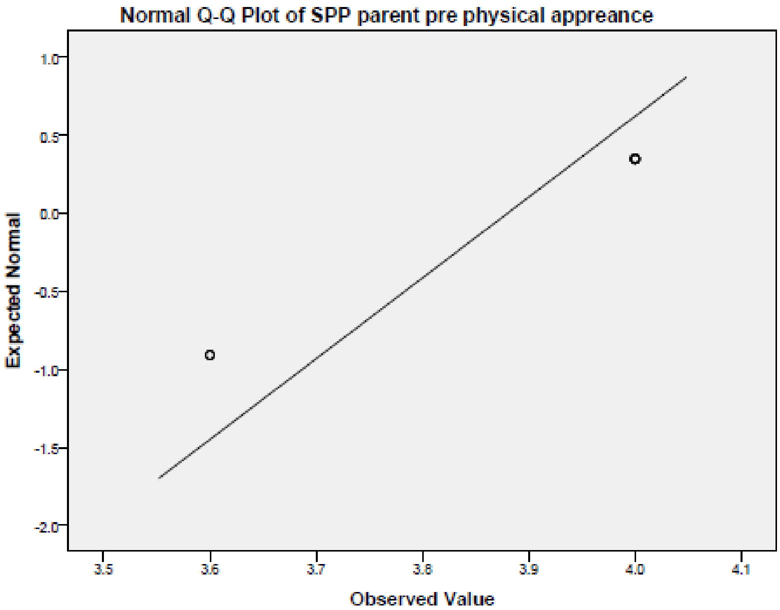


SPP parent pre physical appreance


Normal Q-Q Plot of SPP parent pre physical appreance
Expected Normal
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
3.5
3.6
3.7
3.8
3.9
4.0
4.1
Observed Value

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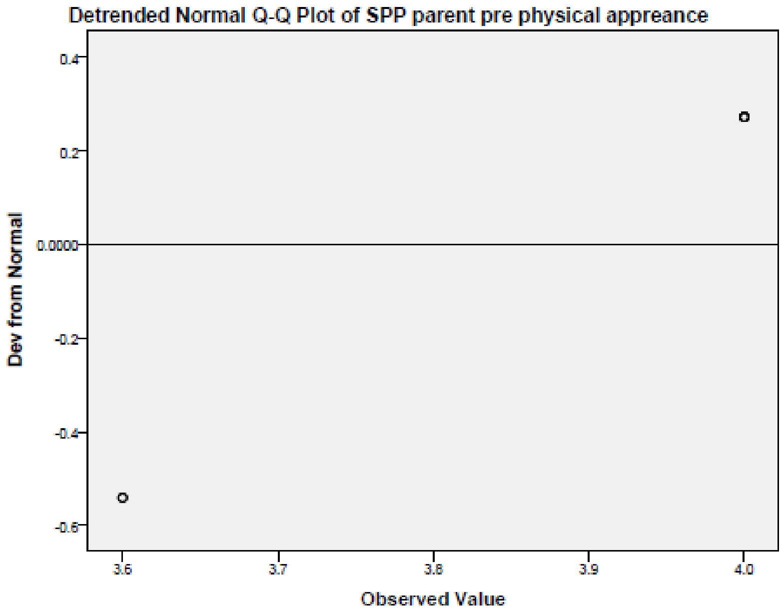

SPP parent pre behavioural conduct

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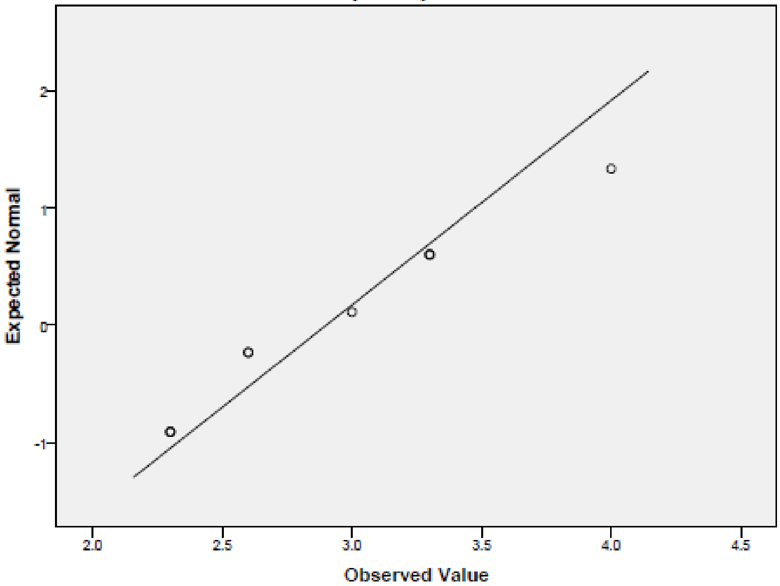
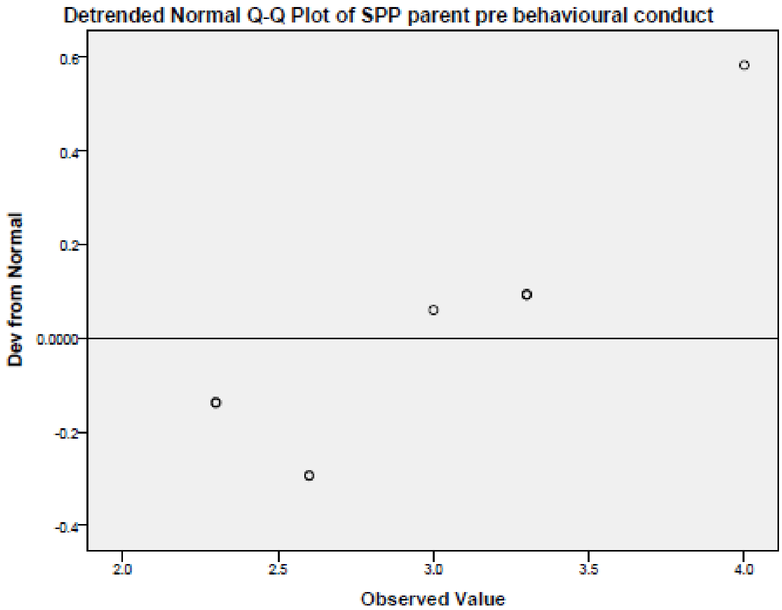
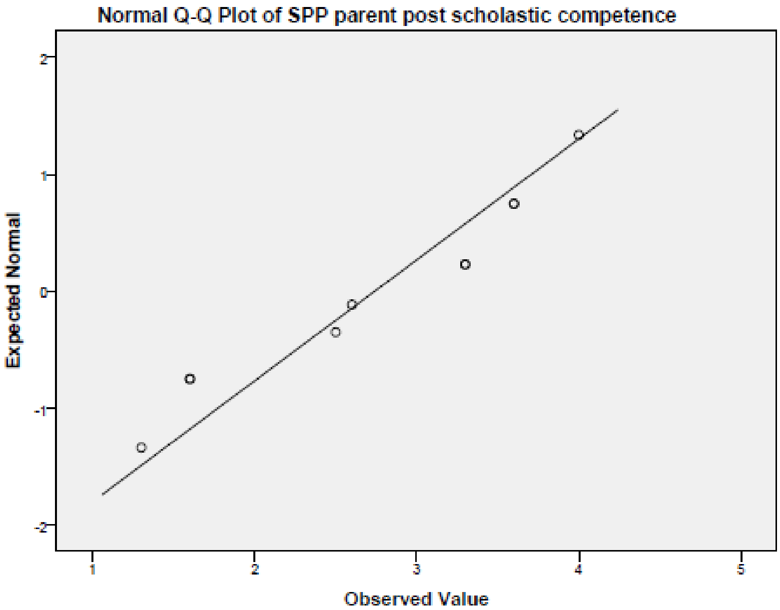
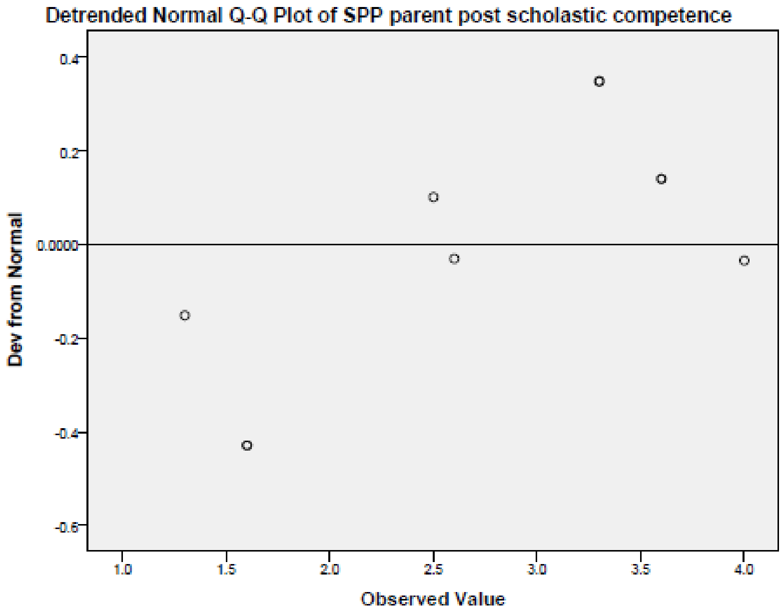
Normal Q-Q Plot of SPP parent pre behavioural conduct



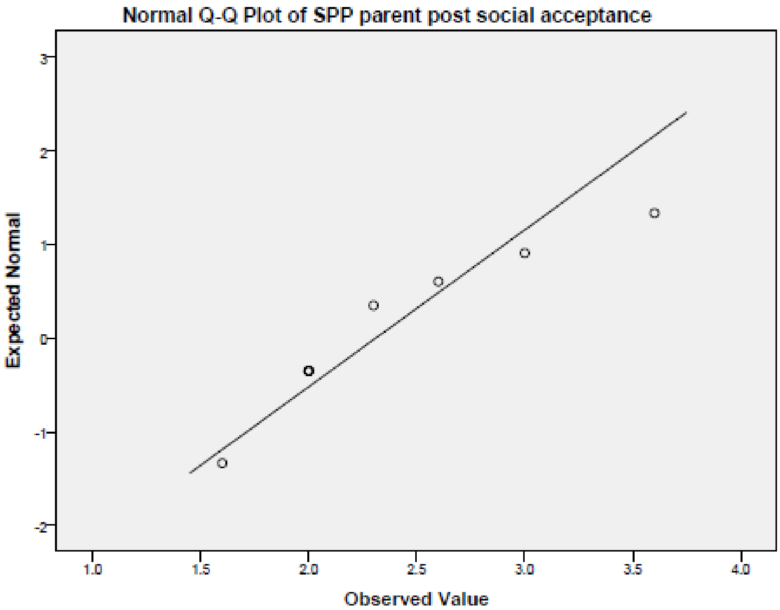


SPP parent post scholastic competence


Normal Q-Q Plot of SPP parent post scholastic competence
Expected Normal
Observed Value
2
1
0
-1
-2
1
2
3
4
5



SPP parent post social acceptance


Normal Q-Q Plot of SPP parent post social acceptance
Expected Normal
3
2
1
0
-1
-2
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Observed Value

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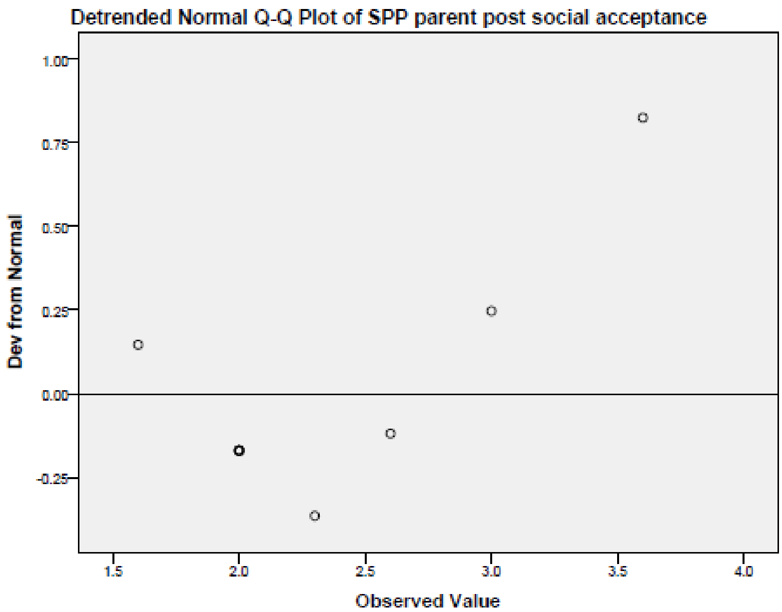
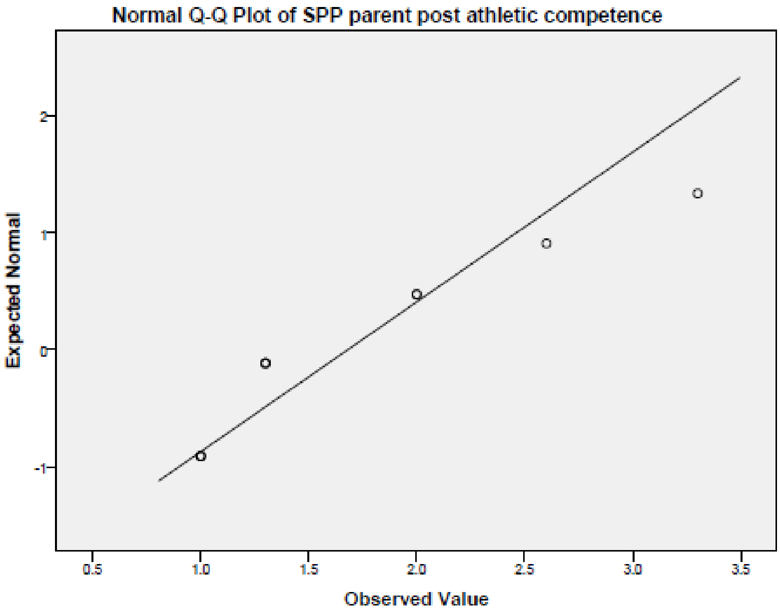


SPP parent post athletic competence


Normal Q-Q Plot of SPP parent post athletic competence
Expected Normal
Observed Value
2
1
0
-1
0.5
1.0
1.5
2.0
2.5
3.0
3.5

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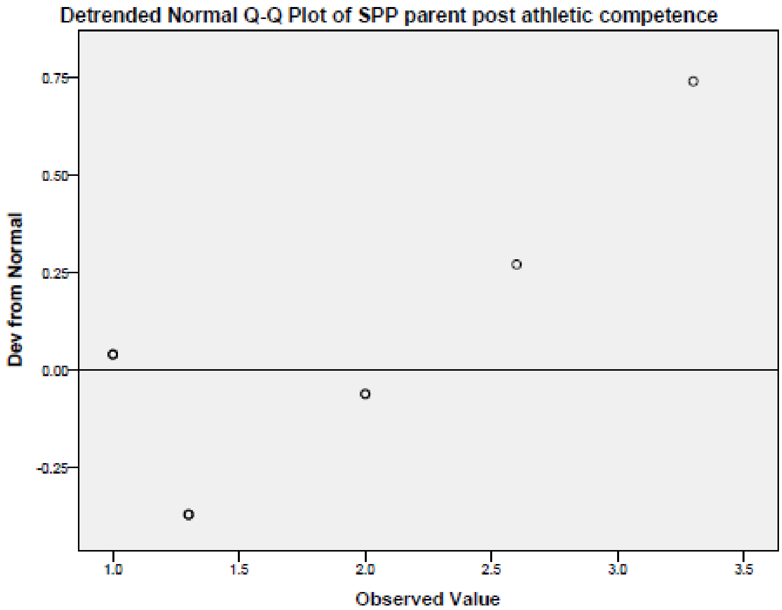
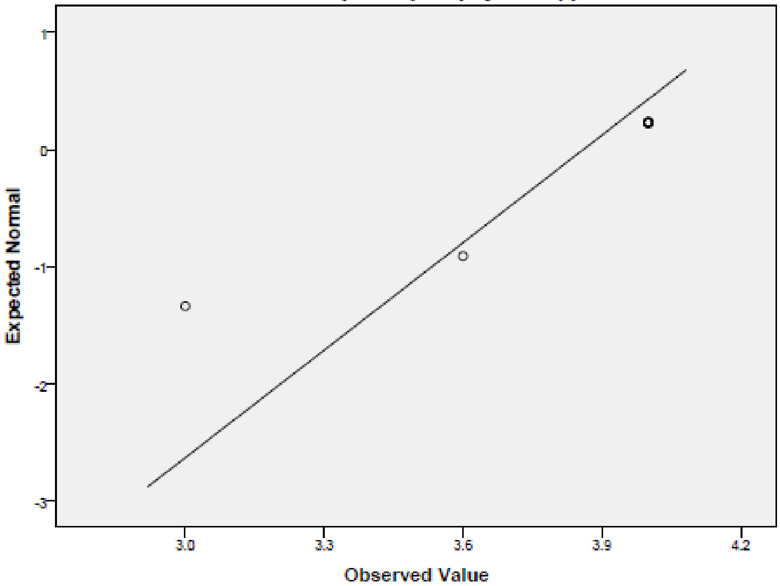


SPP parent post physical apprearance

Normal Q-Q Plot of SPP parent post physical appearance



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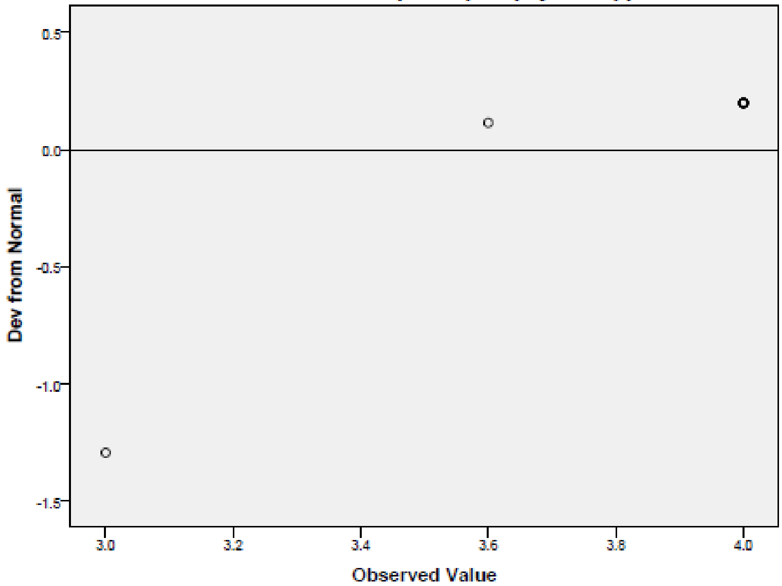
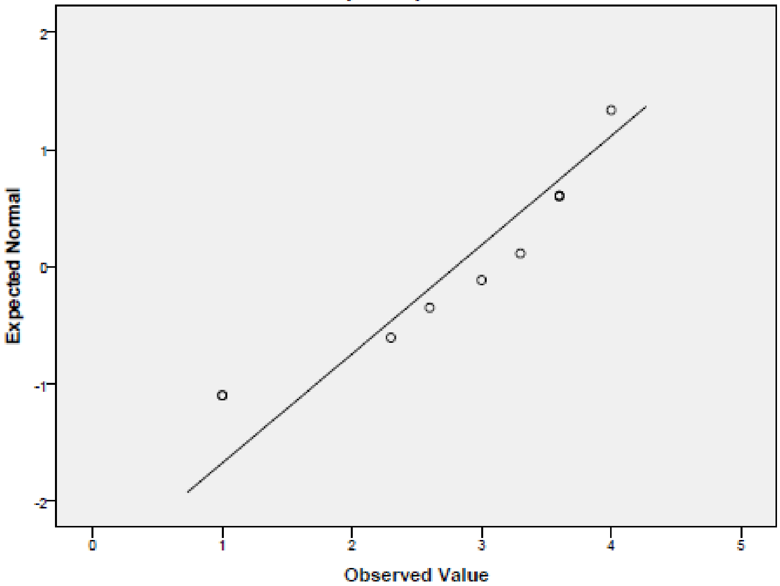
Detrended Normal Q-Q Plot of SPP parent post physical apprearance



SPP parent post behavioural conduct

Normal Q-Q Plot of SPP parent post behavioural conduct



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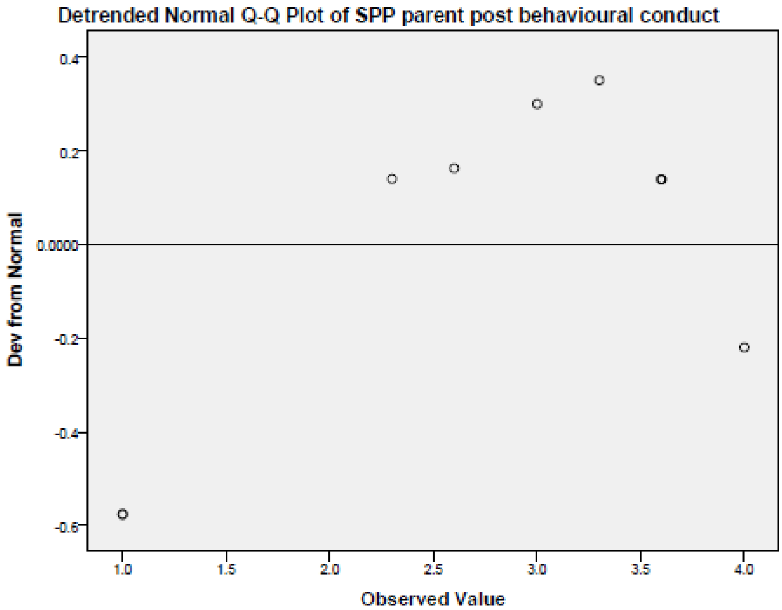

SSQ pupil pre

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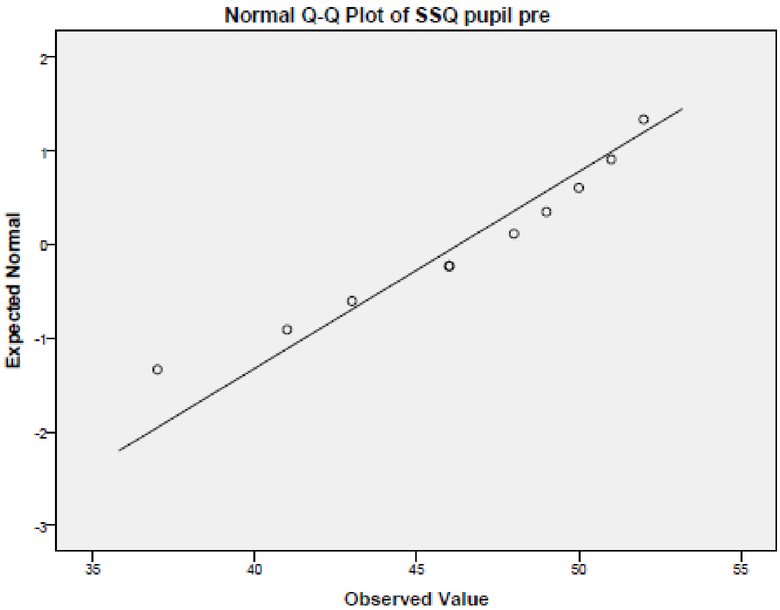
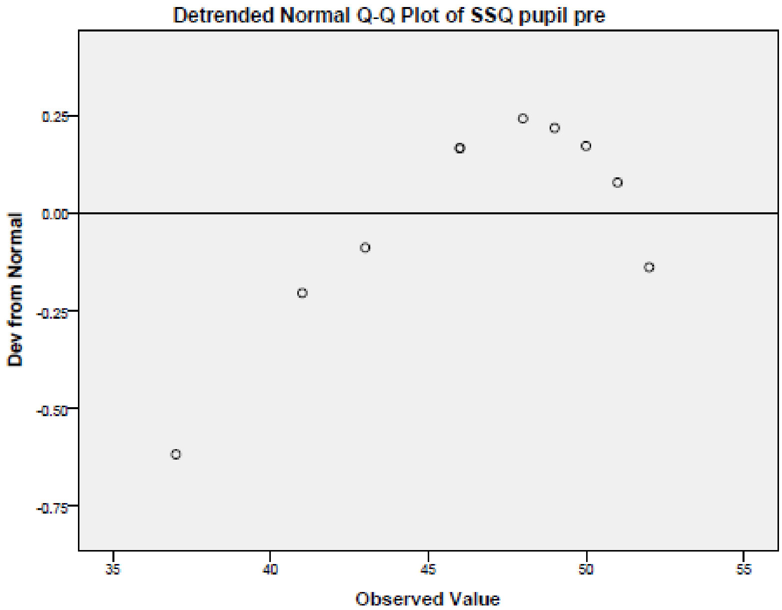
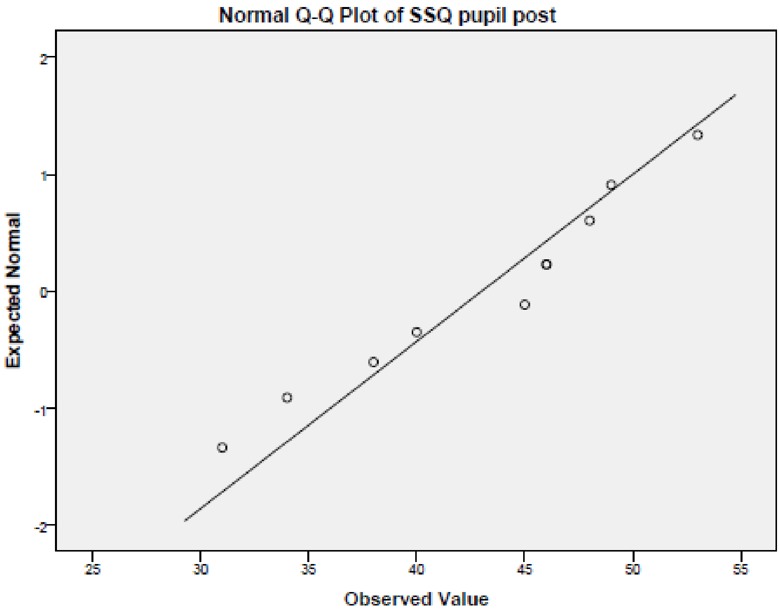
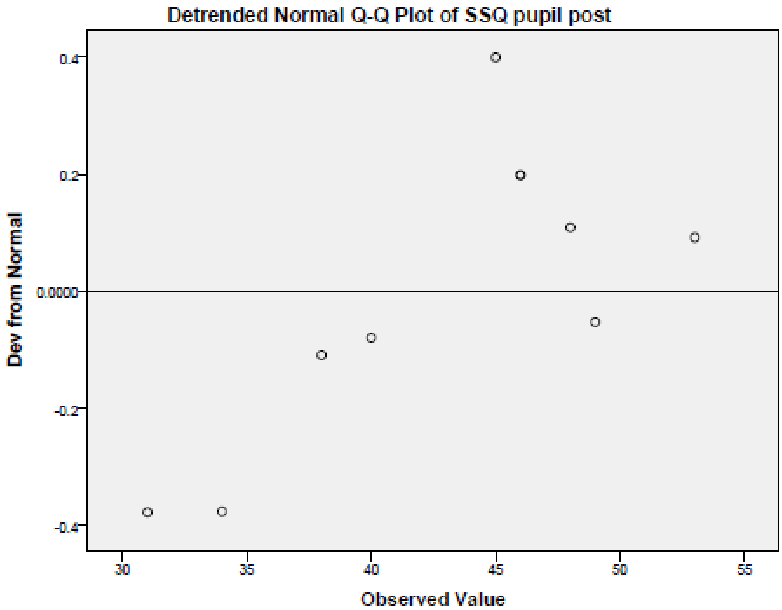

Normal Q-Q Plot of SSQ pupil pre
Expected Normal
Observed Value
2
1
0
-1
-2
-3
35
40
45
50
55



SSQ pupil post

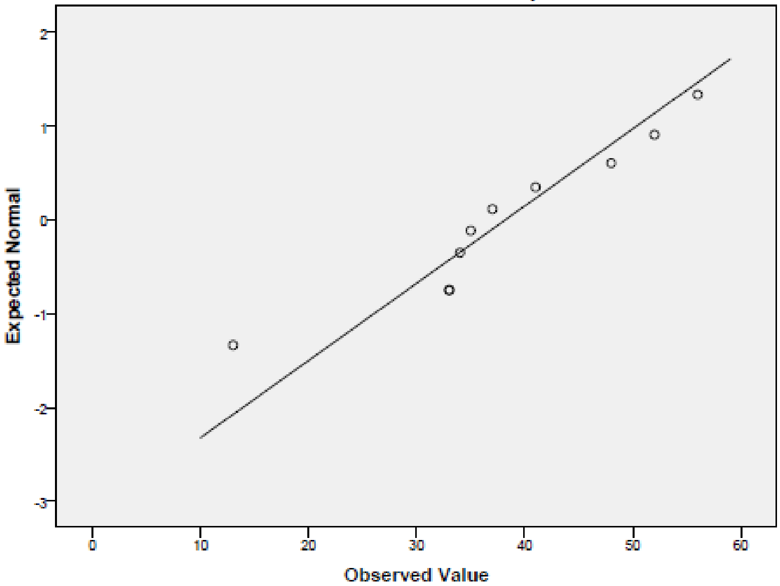

Normal Q-Q Plot of SSQ pupil post
Expected Normal
2
1
0
-1
-2
25
30
35
40
45
50
55
Observed Value

Page 219



SSQ teacher pre

Normal Q-Q Plot of SSQ teacher pre



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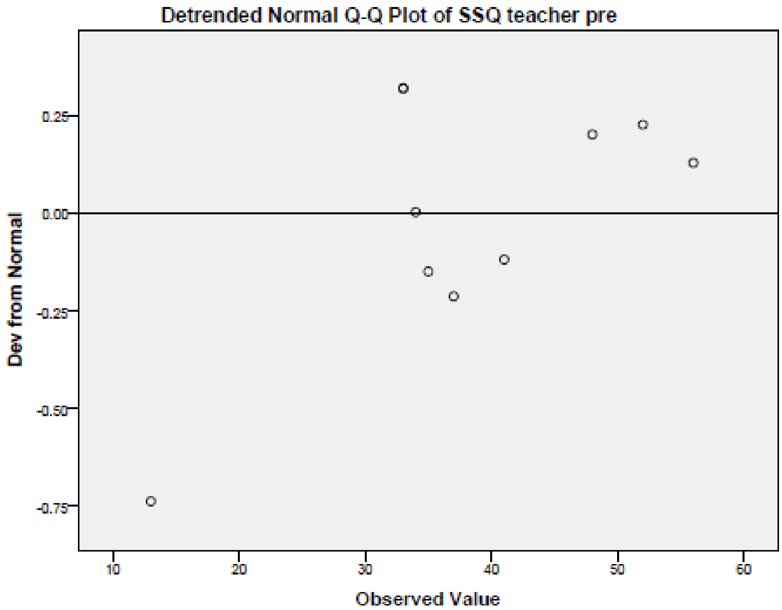

SSQ teacher post

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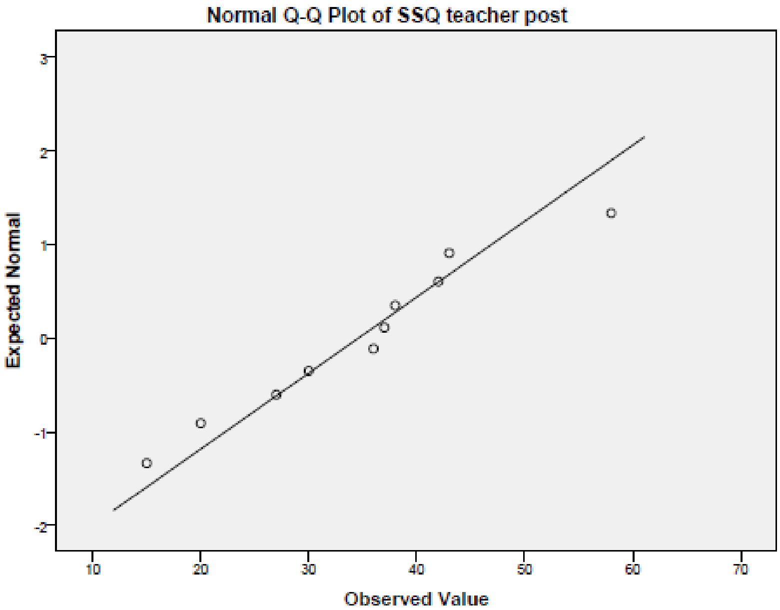
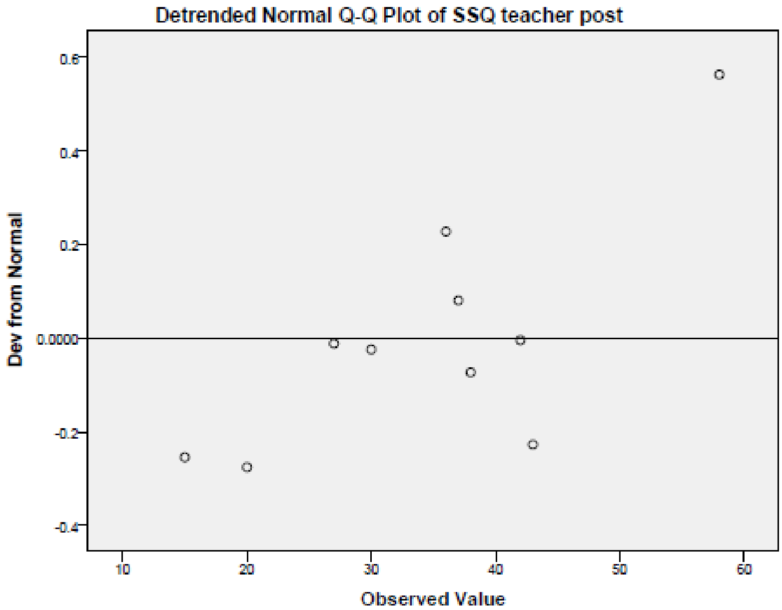

Normal Q-Q Plot of SSQ teacher post
Expected Normal
3
2
1
0
-1
-2
10
20
30
40
50
60
70
Observed Value

Page 223



SSQ parent pre

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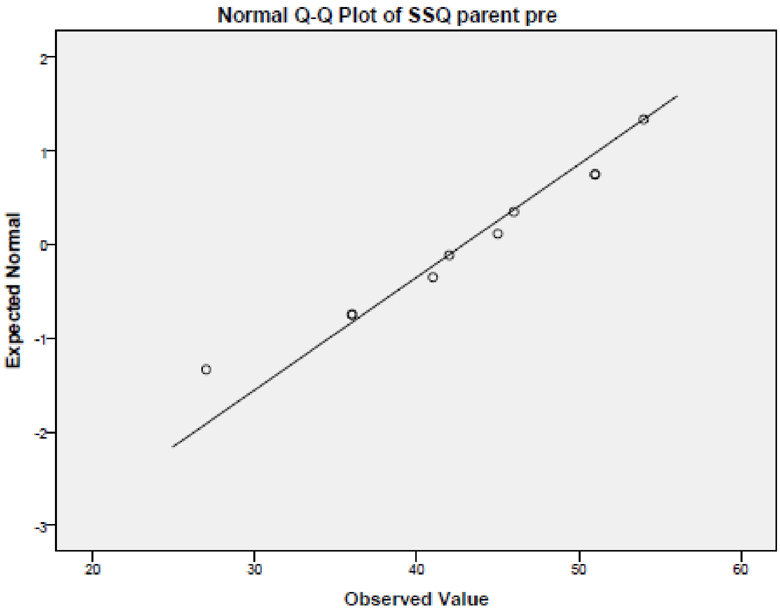
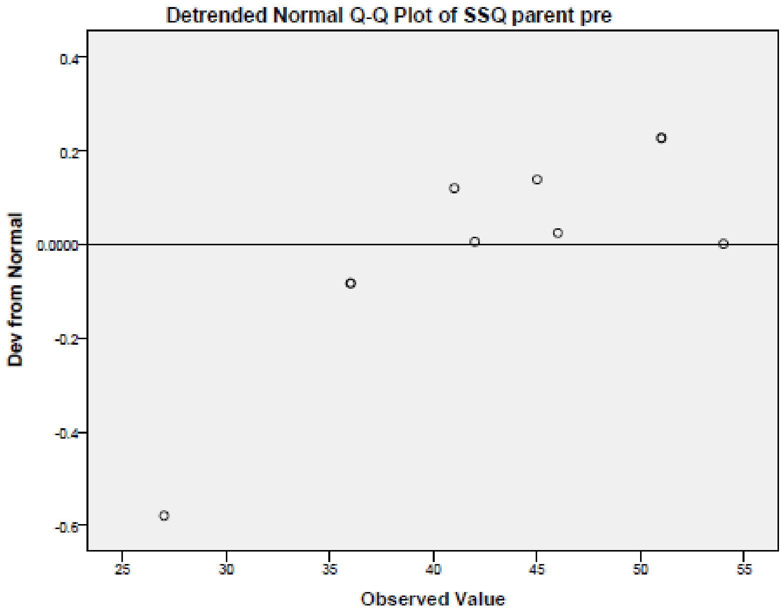
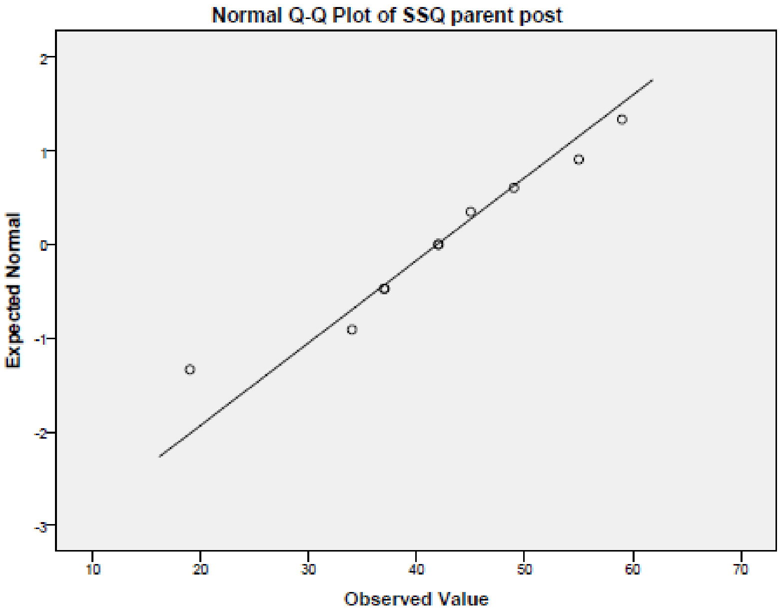

Normal Q-Q Plot of SSQ parent pre
Expected Normal
Observed Value
2
1
0
-1
-2
-3
20
30
40
50
60



SSQ parent post


Normal Q-Q Plot of SSQ parent post
Expected Normal
Observed Value
2
1
0
-1
-2
-3
10
20
30
40
50
60
70

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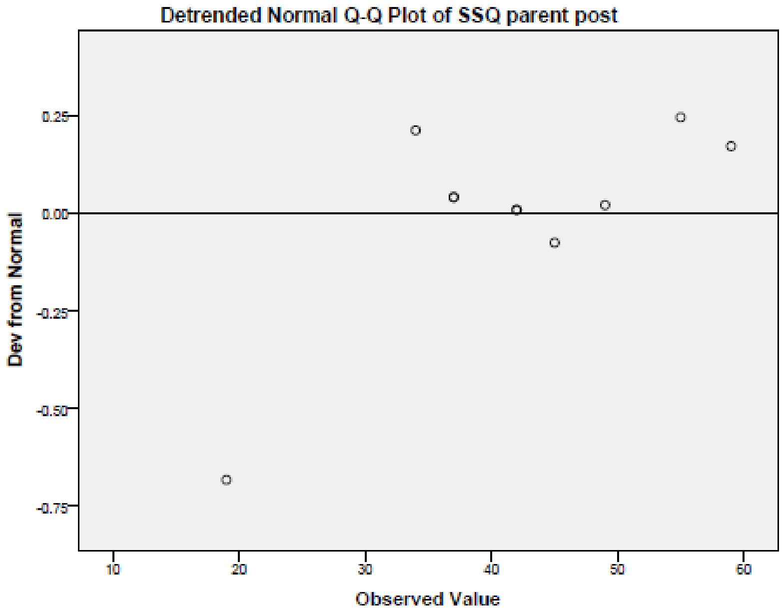
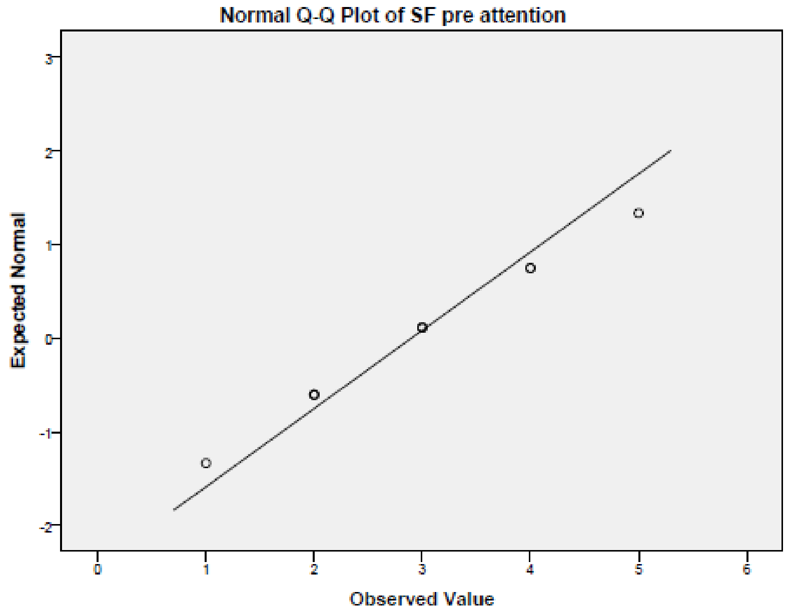
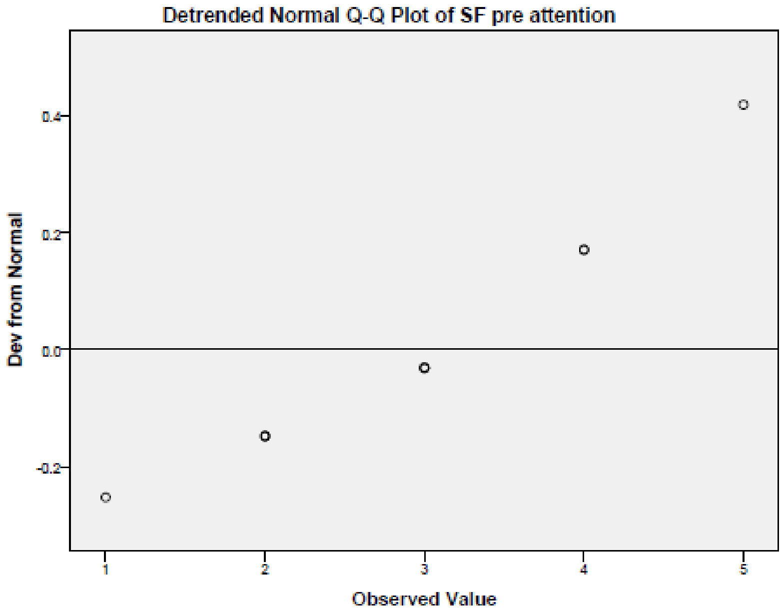
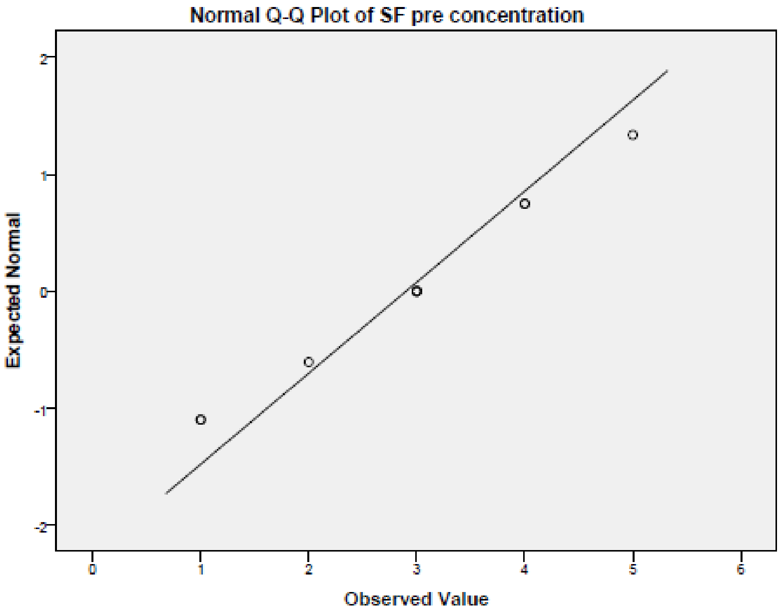


SF pre attention


Normal Q-Q Plot of SF pre attention
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
1
2
3
4
5
6



SF pre concentration


Normal Q-Q Plot of SF pre concentration
Expected Normal
Observed Value
2
1
0
-1
-2
0
1
2
3
4
5
6

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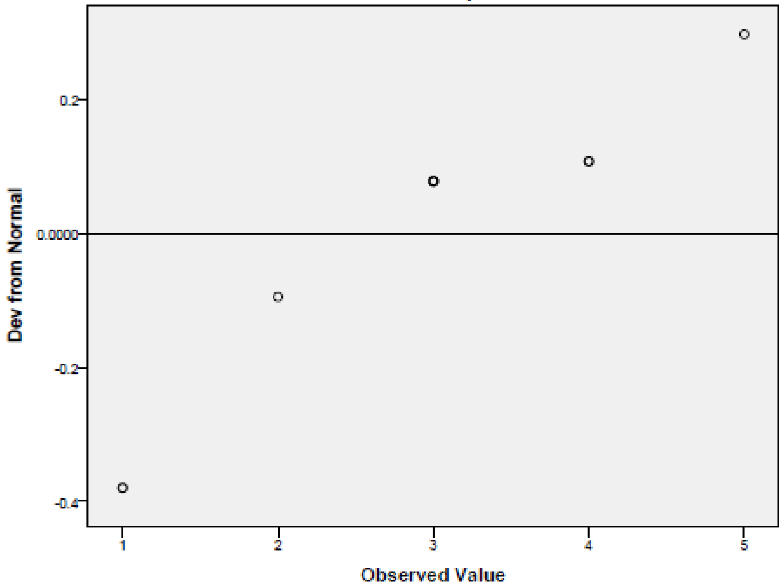
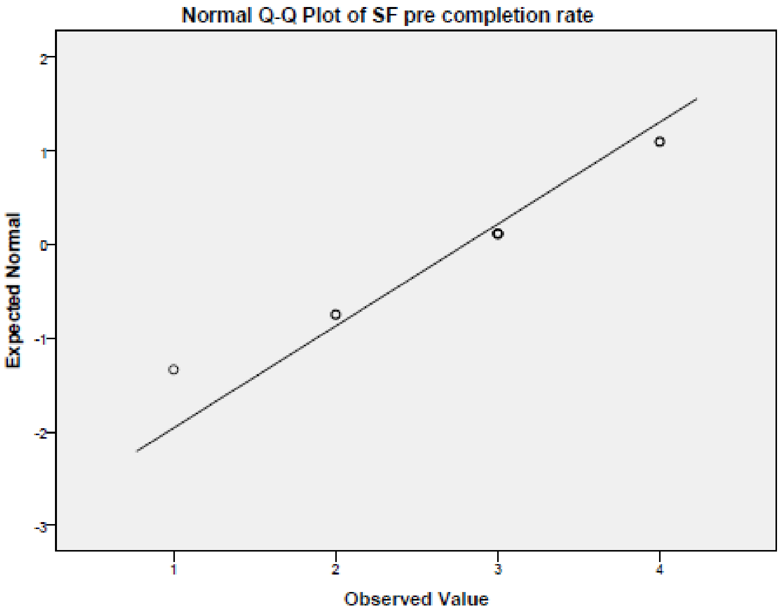
Detrended Normal Q-Q Plot of SF pre concentration



SF pre completion rate


Normal Q-Q Plot of SF pre completion rate
Expected Normal
Observed Value
2
1
0
-1
-2
-3
1
2
3
4

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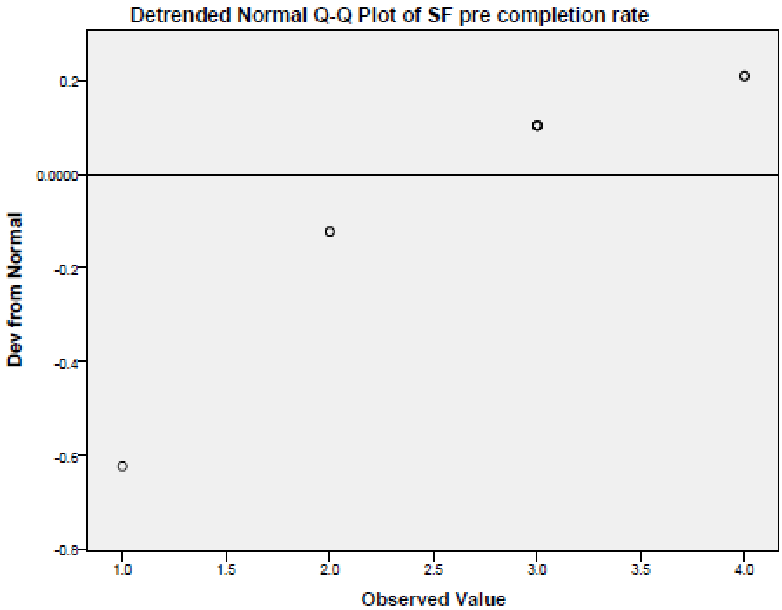
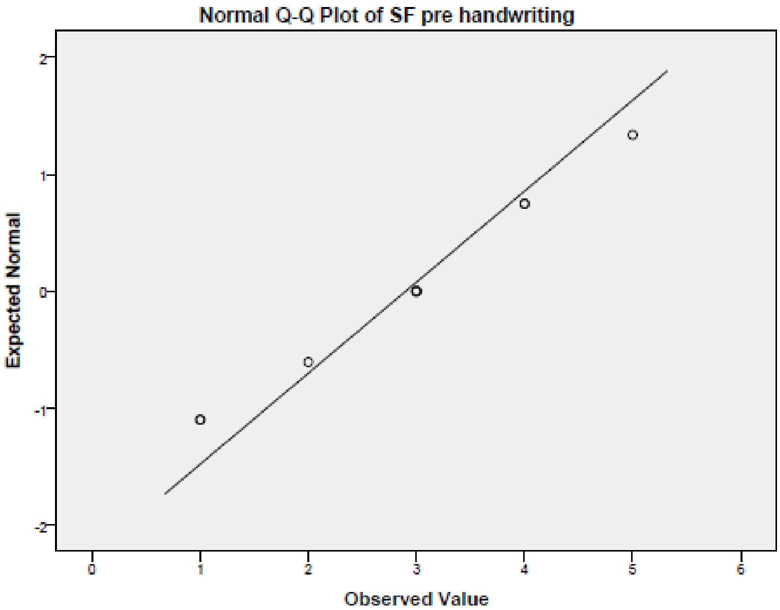


SF pre handwriting


Normal Q-Q Plot of SF pre handwriting
Expected Normal
Observed Value
2
1
0
-1
-2
0
1
2
3
4
5
6

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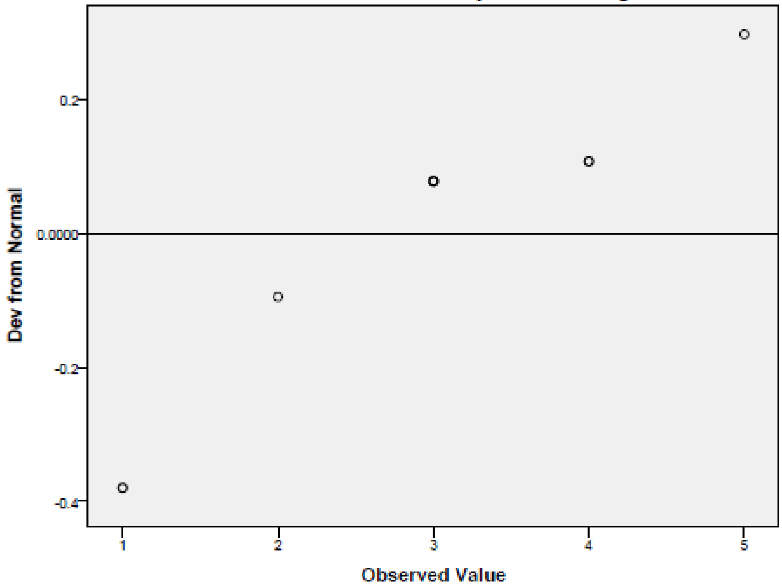
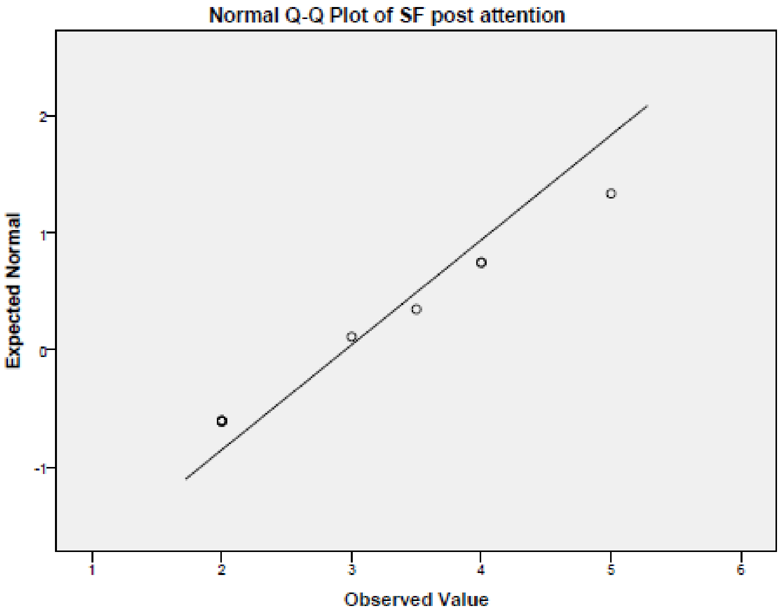
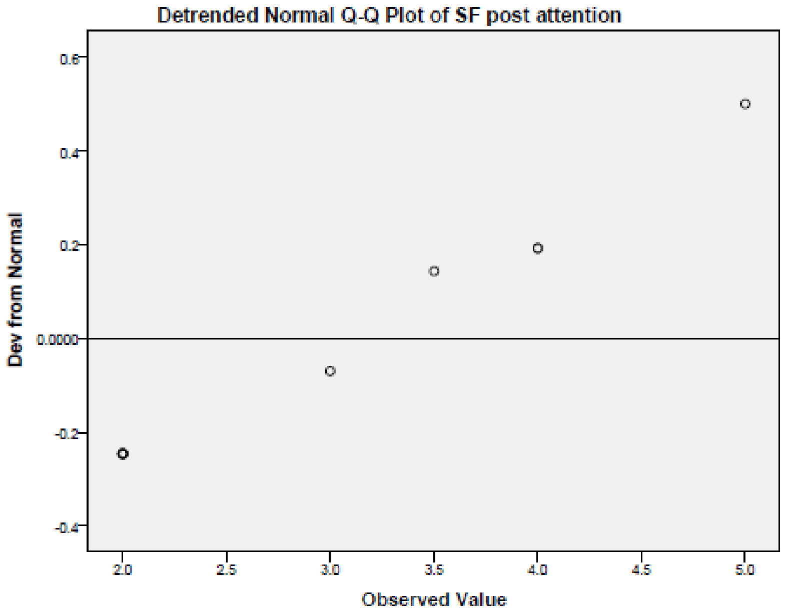
Detrended Normal Q-Q Plot of SF pre handwriting



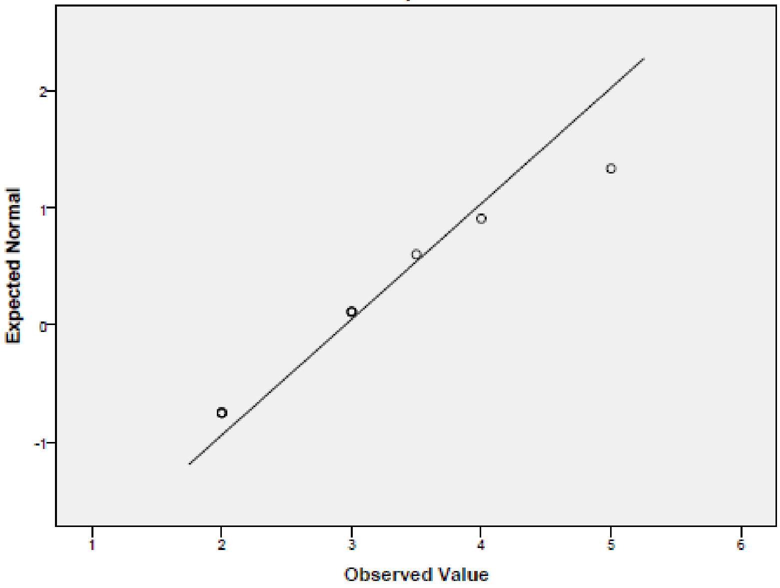
SF post attention


Normal Q-Q Plot of SF post attention
Expected Normal
Observed Value
2
1
0
-1
1
2
3
4
5
6



SF post concentration

Normal Q-Q Plot of SF post concentration



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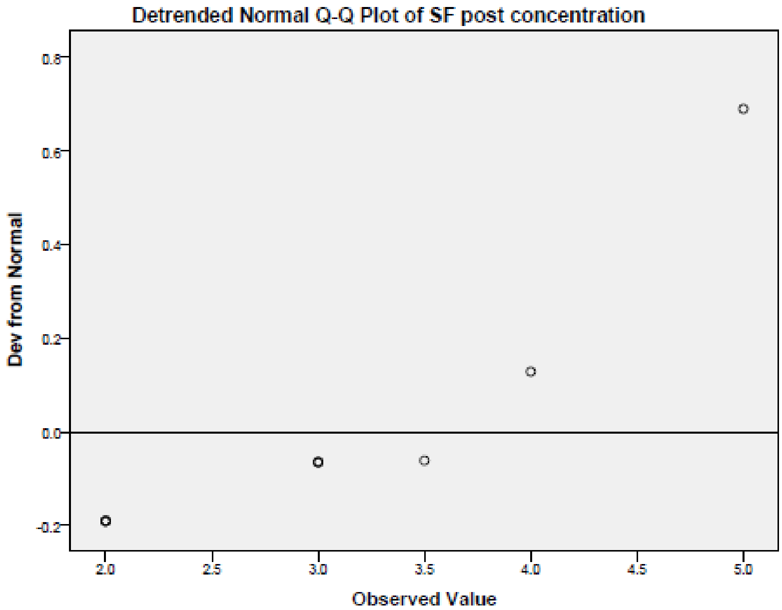
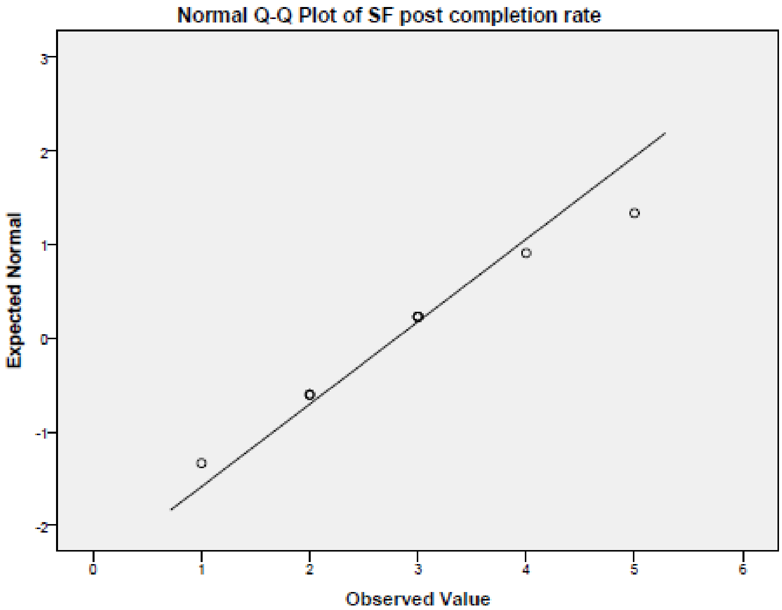


SF post completion rate


Normal Q-Q Plot of SF post completion rate
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
1
2
3
4
5
6

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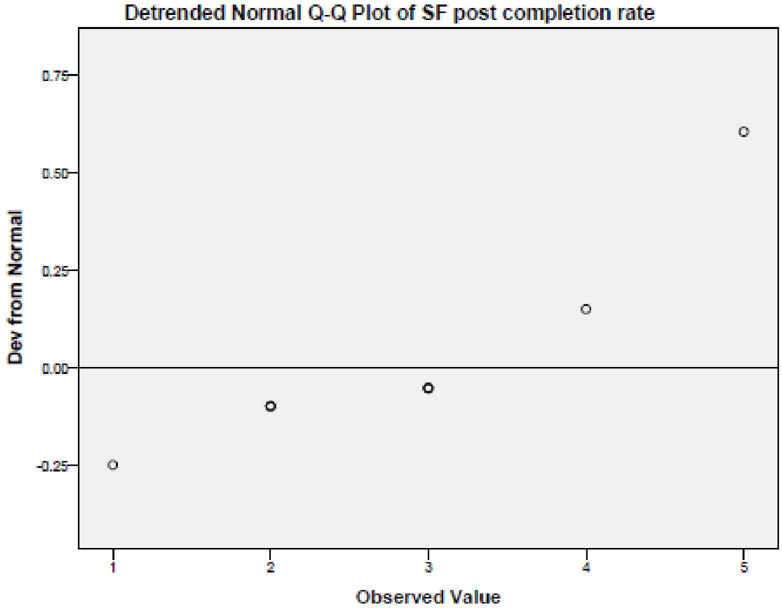
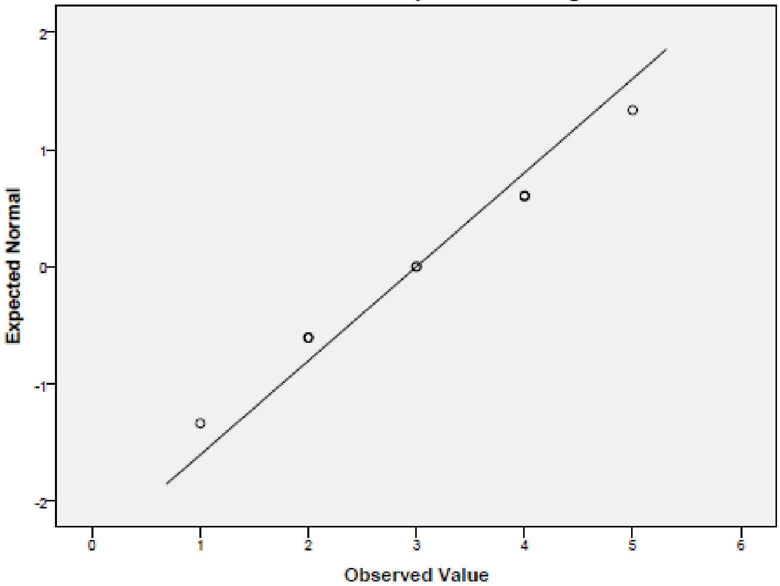
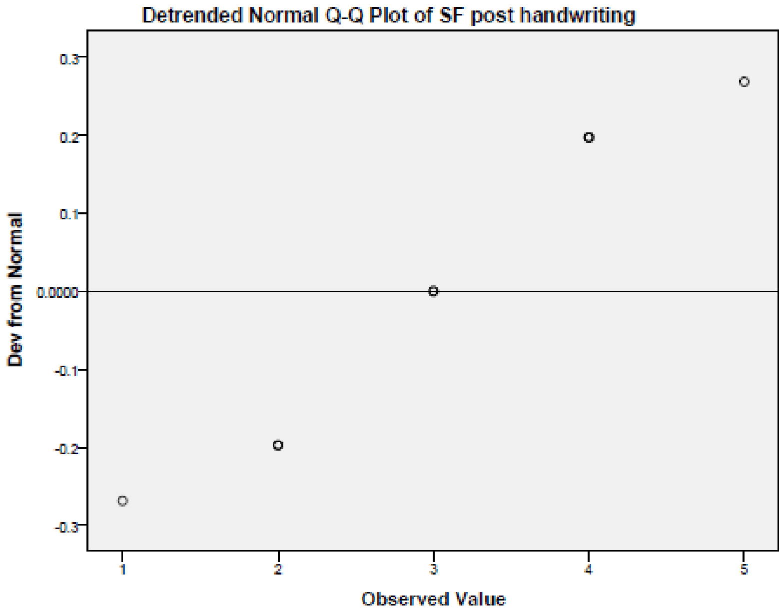
Detrended Normal Q-Q Plot of SF post completion rate



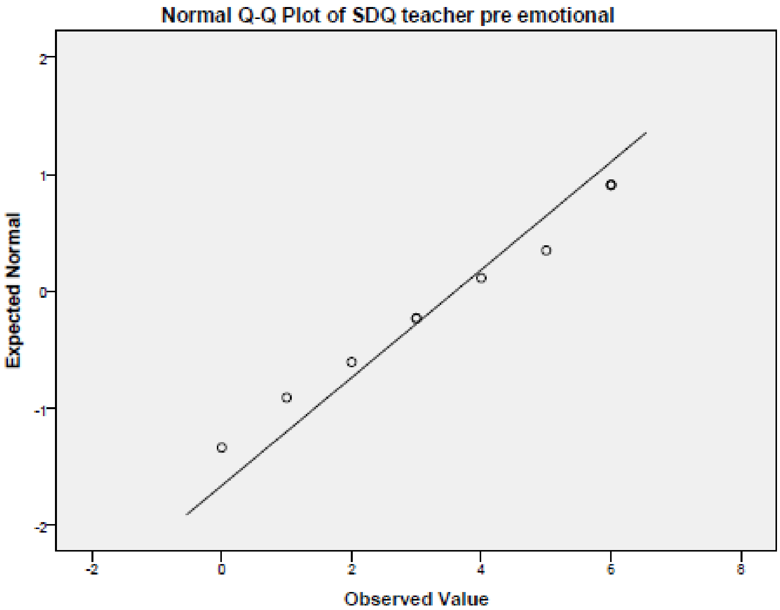
SF post handwriting

Normal Q-Q Plot of SF post handwriting





SDQ teacher pre emotional


Normal Q-Q Plot of SDQ teacher pre emotional
Expected Normal
Observed Value
2
1
0
-1
-2
-2
0
2
4
6
8

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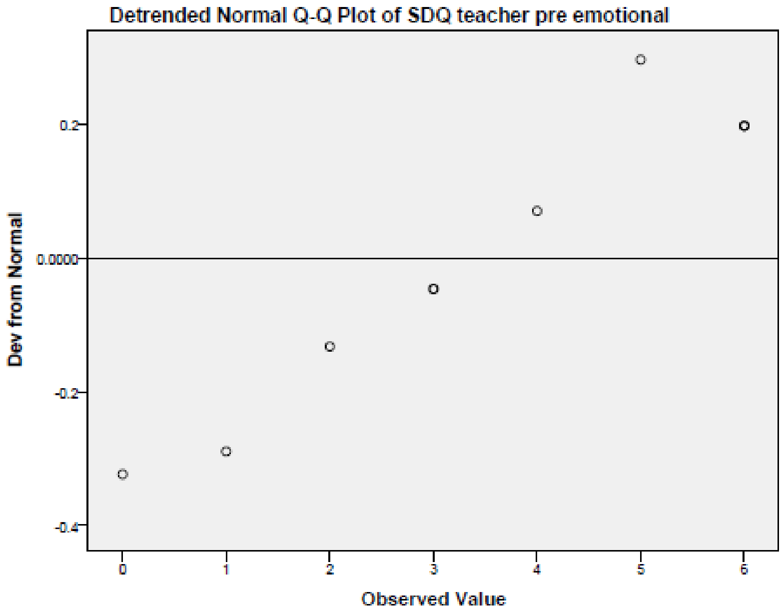
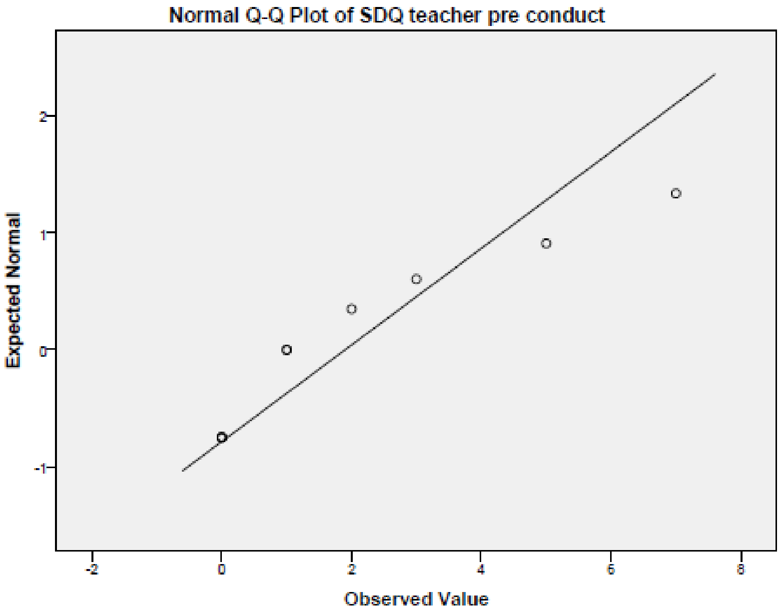


SDQ teacher pre conduct


Normal Q-Q Plot of SDQ teacher pre conduct
Expected Normal
2
1
0
-1
-2
0
2
4
6
8
Observed Value

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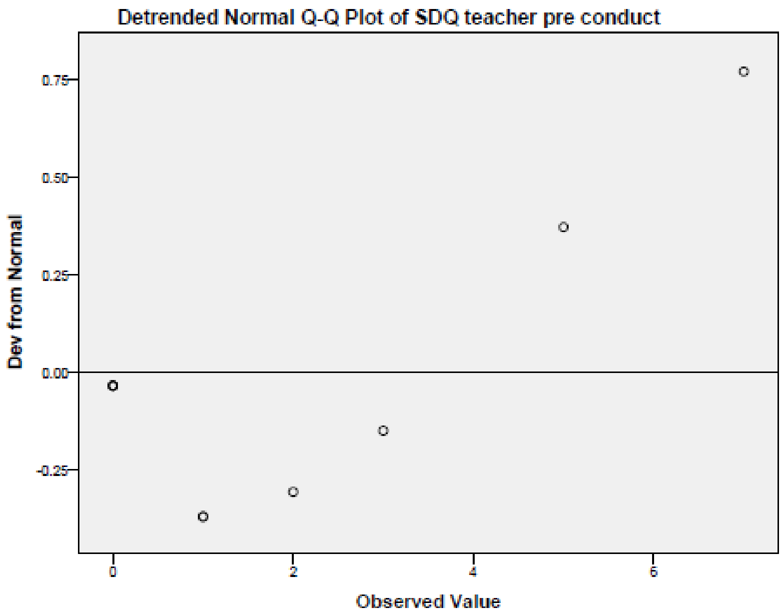

SDQ teacher pre hyperactivity

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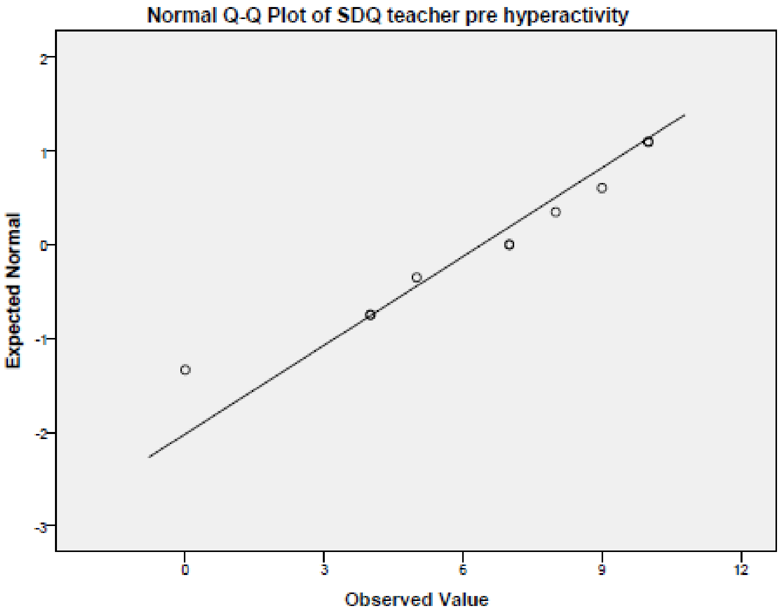
Normal Q-Q Plot of SDQ teacher pre hyperactivity
Expected Normal
Observed Value
2
1
0
-1
-2
-3
0
3
6
9
12

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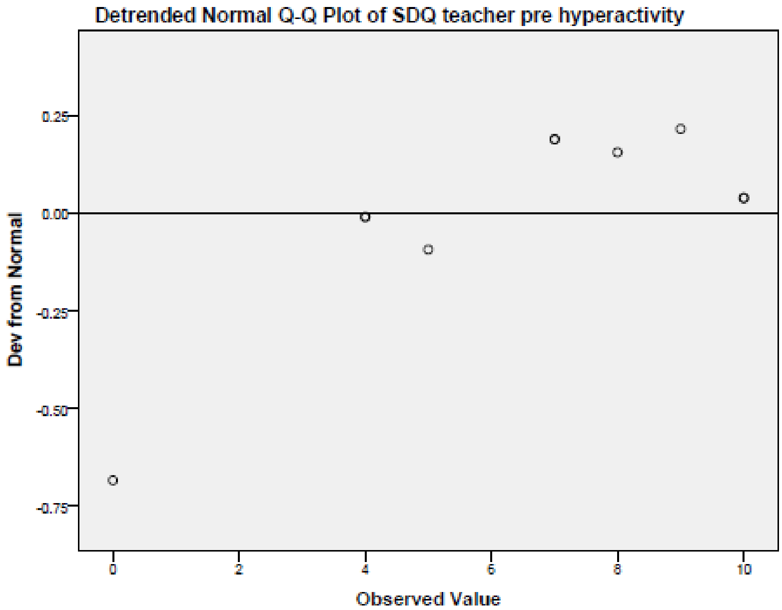

SDQ teacher pre peer relationship

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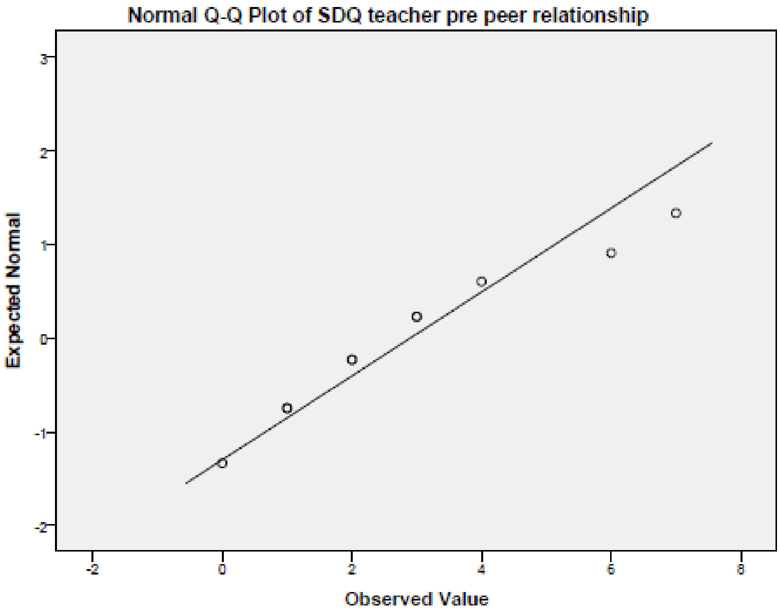
Normal Q-Q Plot of SDQ teacher pre peer relationship
Expected Normal
3
2
1
0
-1
-2
-2
0
2
4
6
8
Observed Value

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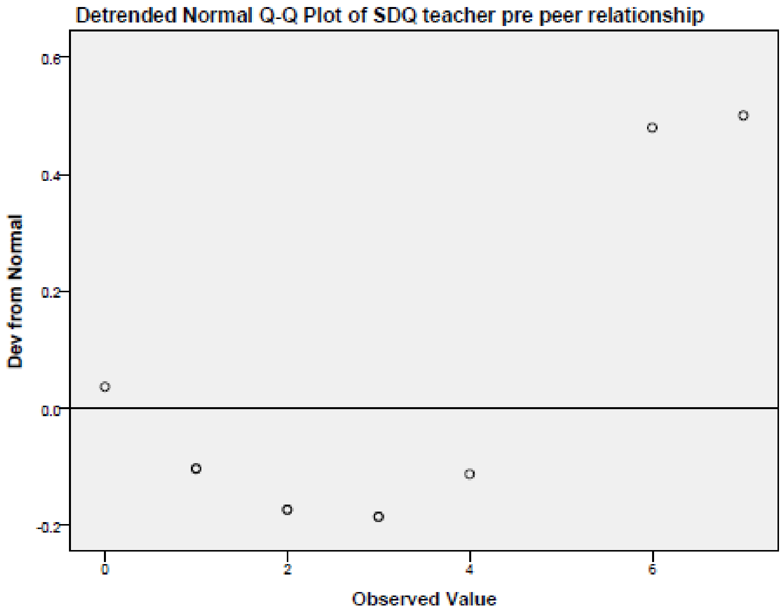
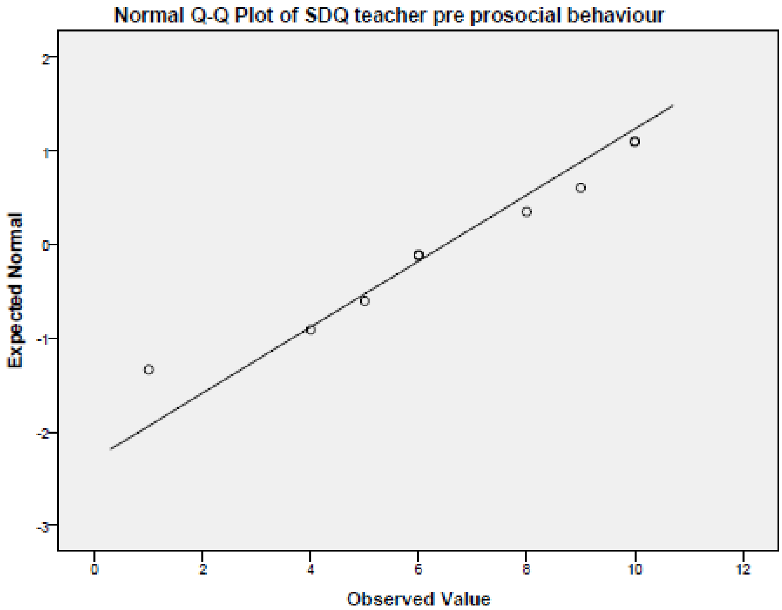
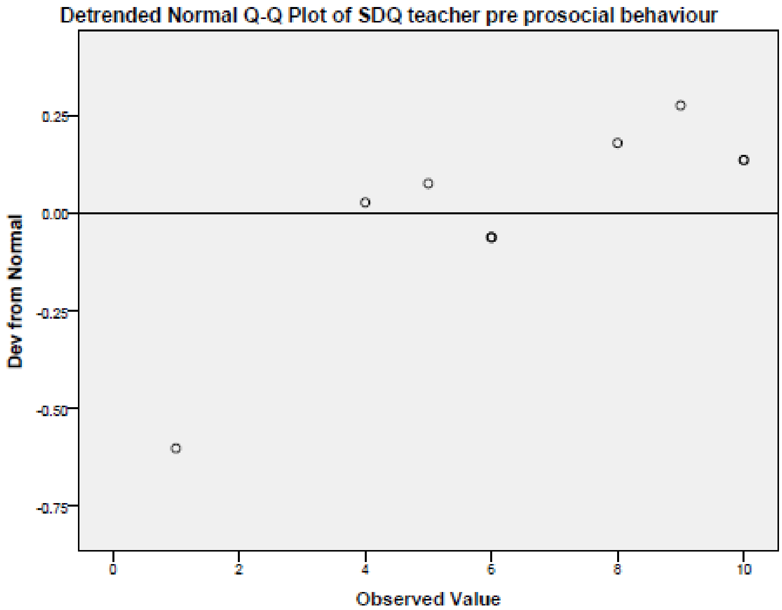
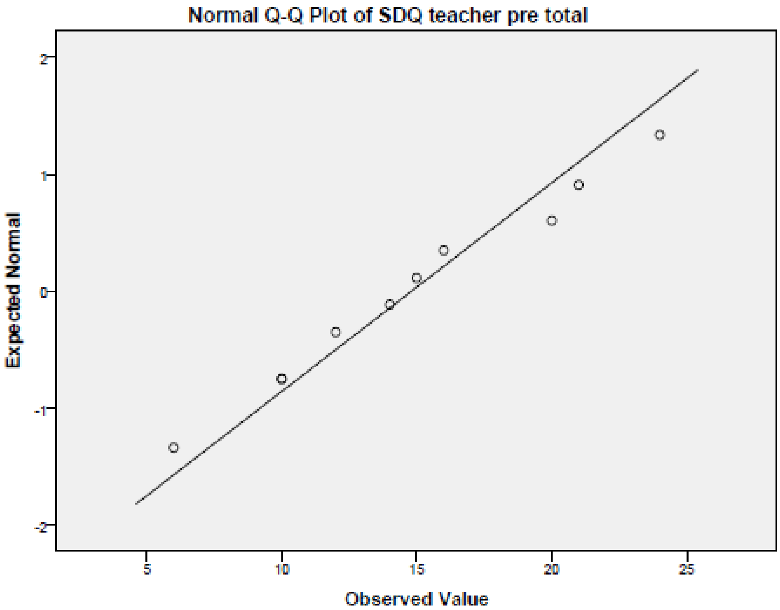


SDQ teacher pre prosocial behaviour


Normal Q-Q Plot of SDQ teacher pre prosocial behaviour
Expected Normal
Observed Value
2
1
0
-1
-2
-3
0
2
4
6
8
10
12



SDQ teacher pre total


Normal Q-Q Plot of SDQ teacher pre total
Expected Normal
Observed Value
2
1
0
-1
-2
5
10
15
20
25

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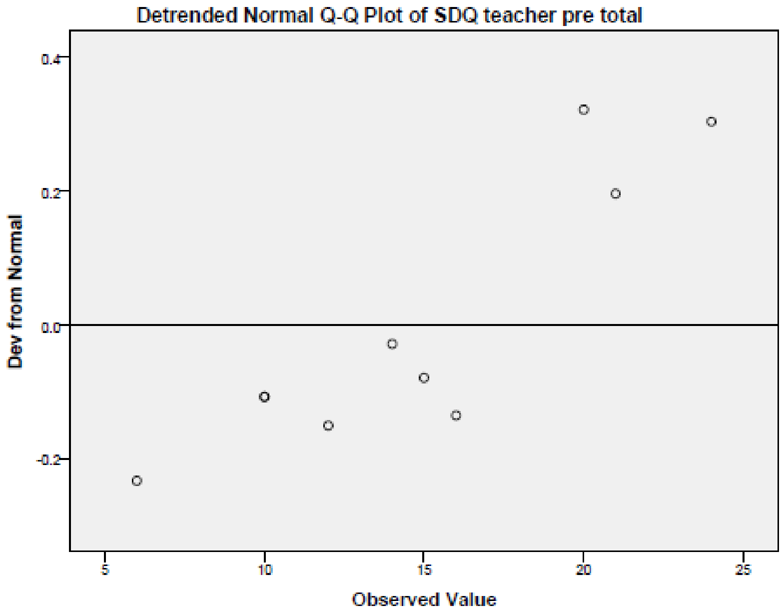
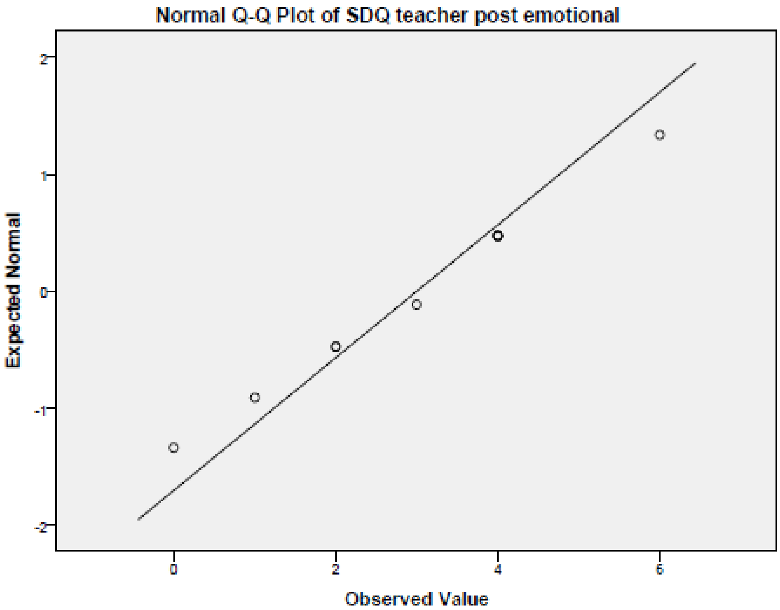


SDQ teacher post emotional


Normal Q-Q Plot of SDQ teacher post emotional
Expected Normal
2
1
0
-1
-2
0
2
4
6
Observed Value

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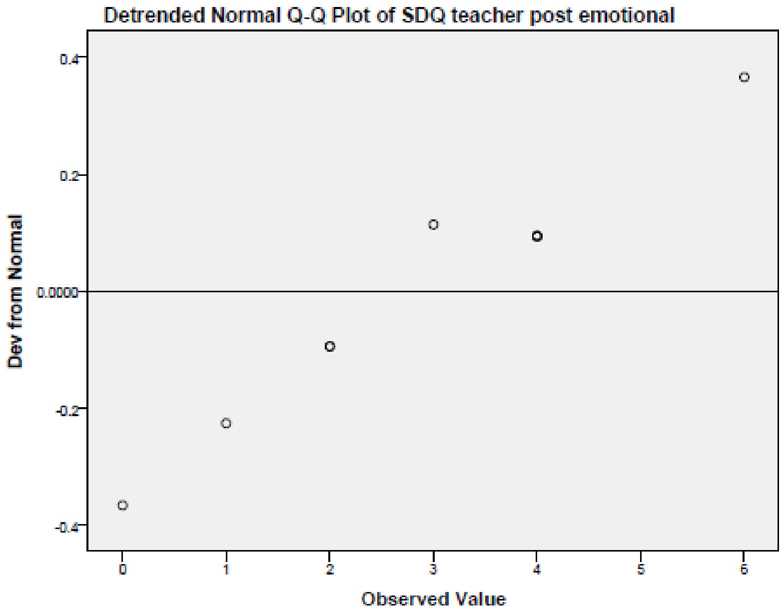
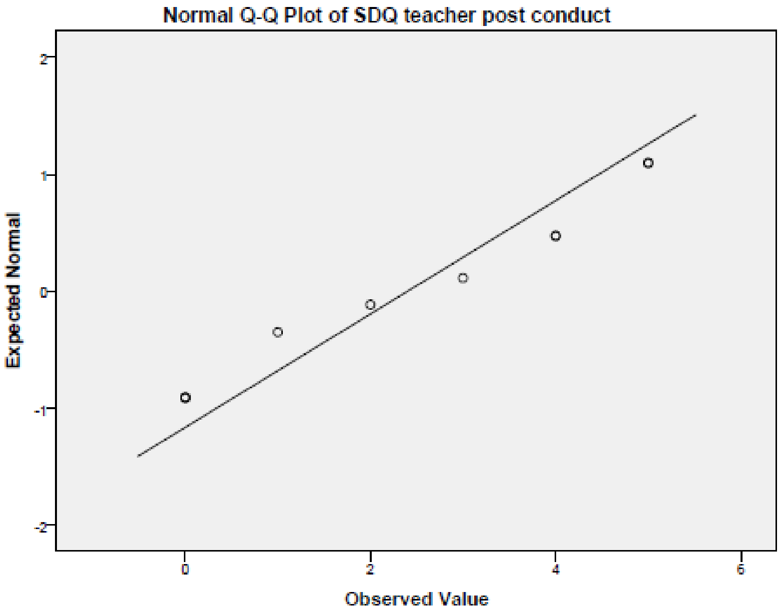


SDQ teacher post conduct


Normal Q-Q Plot of SDQ teacher post conduct
Expected Normal
Observed Value
2
1
0
-1
-2
0
2
4
6

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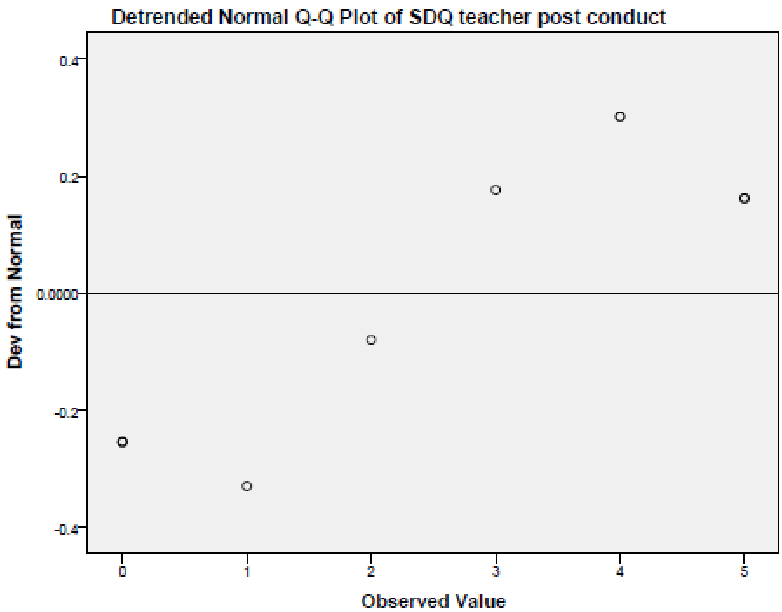
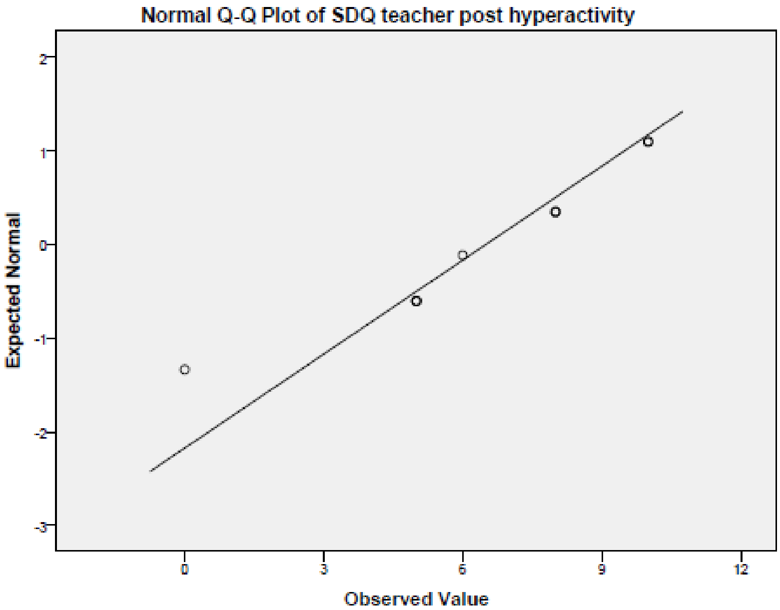


SDQ teacher post hyperactivity


Normal Q-Q Plot of SDQ teacher post hyperactivity
Expected Normal
2
1
0
-1
-2
-3
0
3
6
9
12
Observed Value

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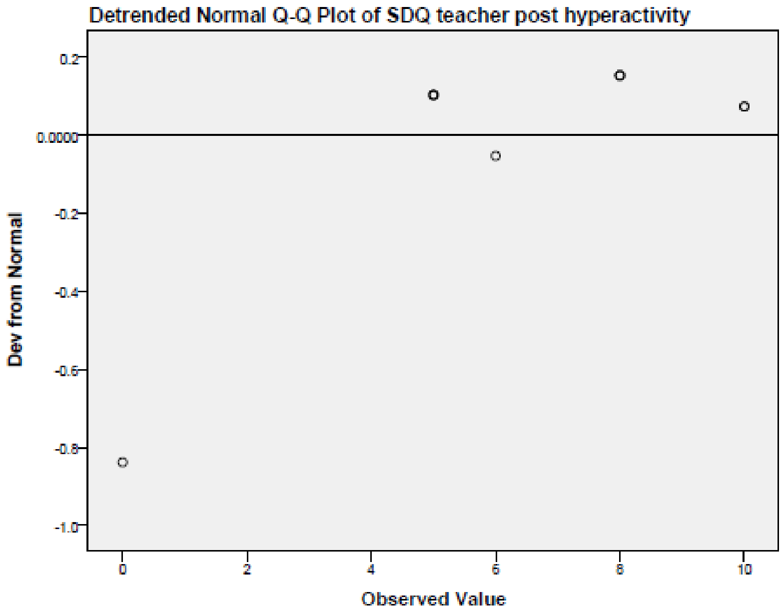
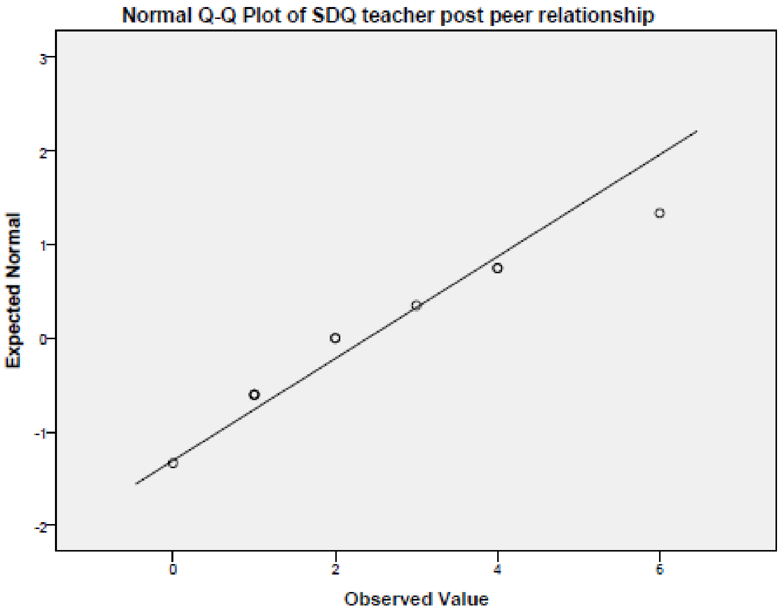
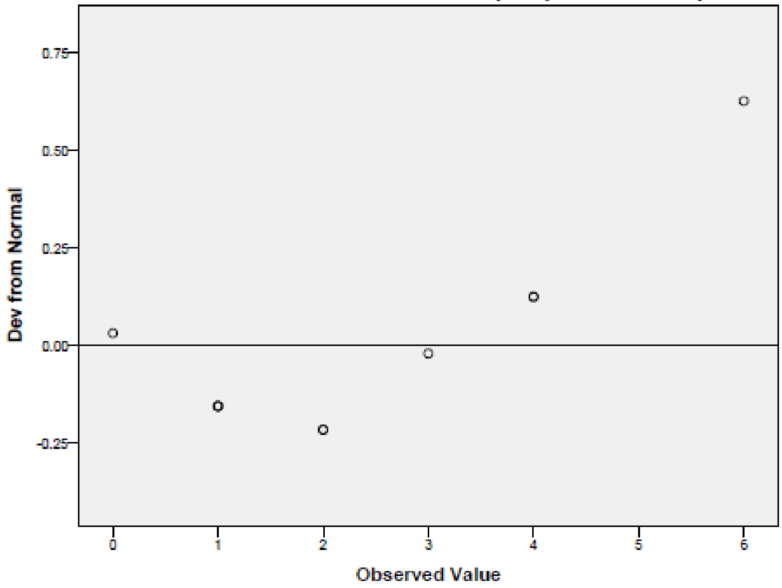


SDQ teacher post peer relationship


Normal Q-Q Plot of SDQ teacher post peer relationship
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
2
4
6

Detrended Normal Q-Q Plot of SDQ teacher post peer relationship



SDQ teacher post prosocial

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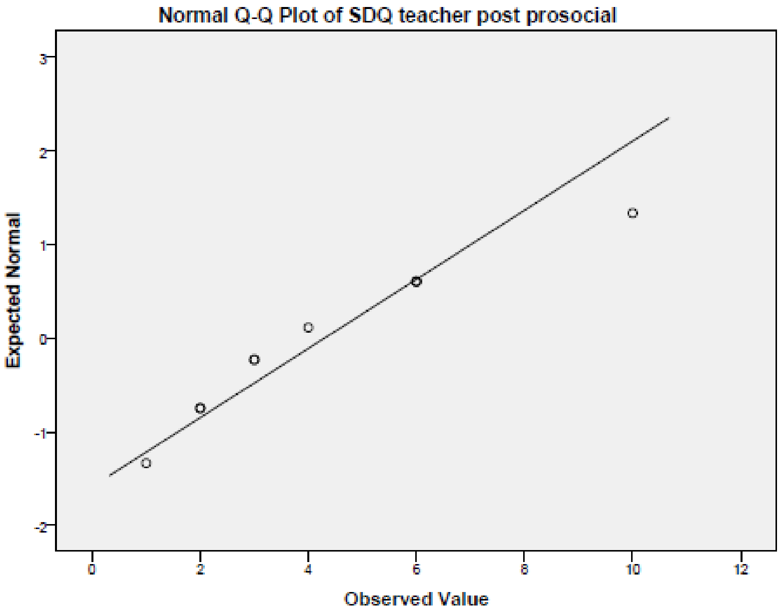
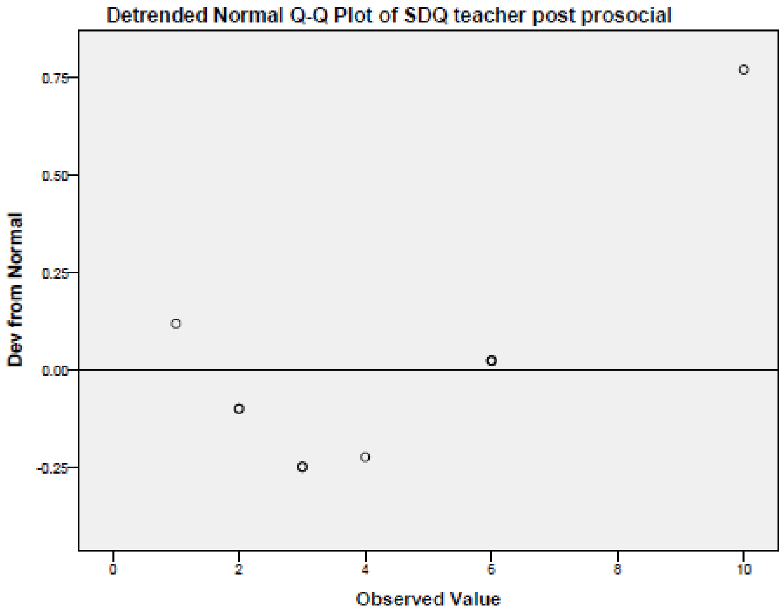
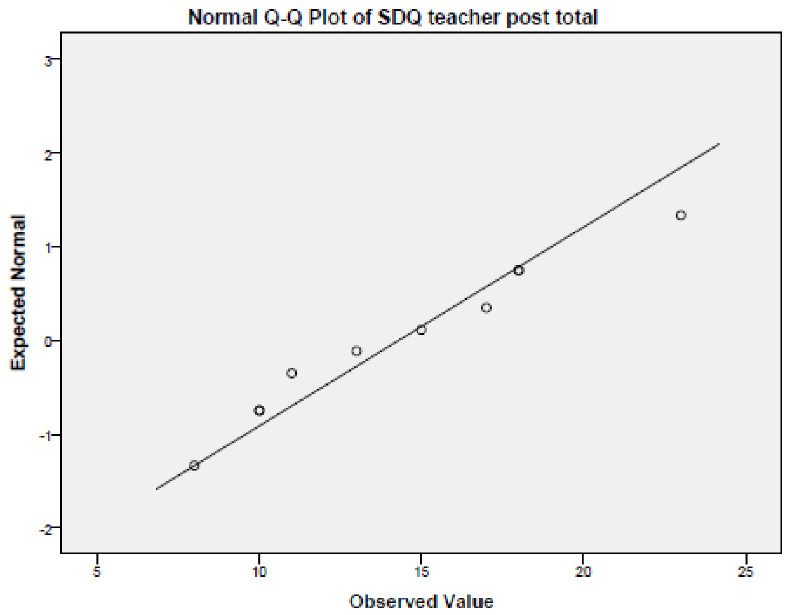

Normal Q-Q Plot of SDQ teacher post prosocial
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
2
4
6
8
10
12



SDQ teacher post total


Normal Q-Q Plot of SDQ teacher post total
Expected Normal
Observed Value
3
2
1
0
-1
-2
5
10
15
20
25

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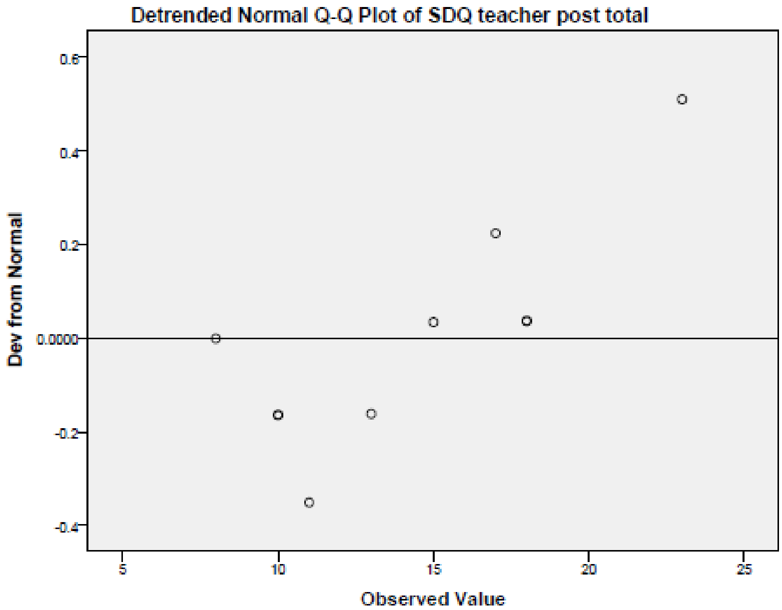

SDQ parent pre emotional

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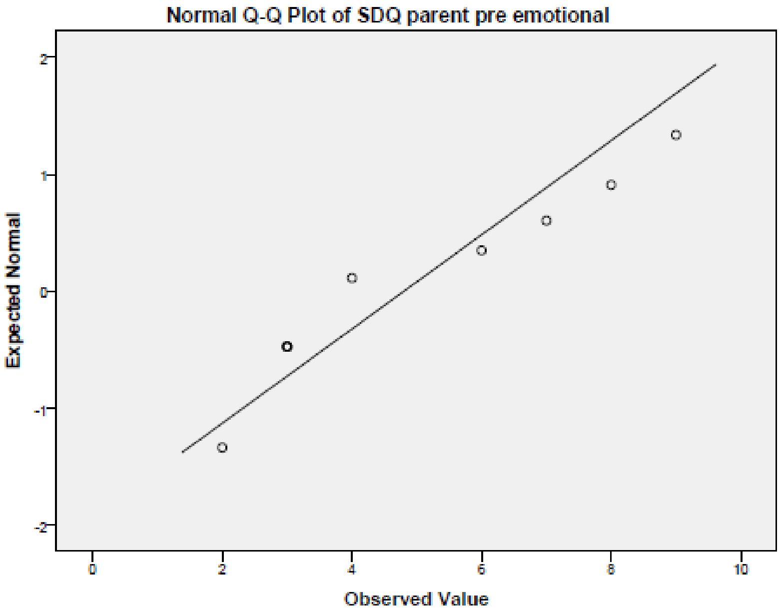
Normal Q-Q Plot of SDQ parent pre emotional
Expected Normal
Observed Value
2
1
0
-1
-2
0
2
4
6
8
10

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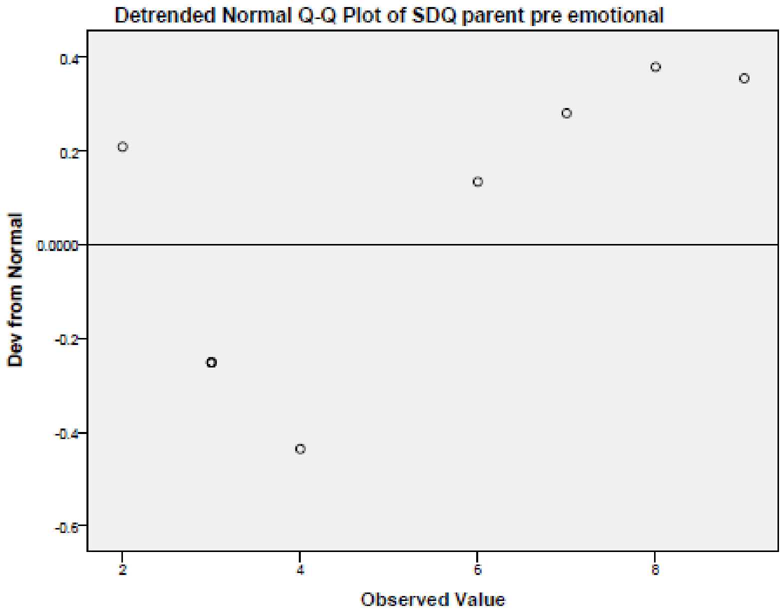

SDQ parent pre conduct

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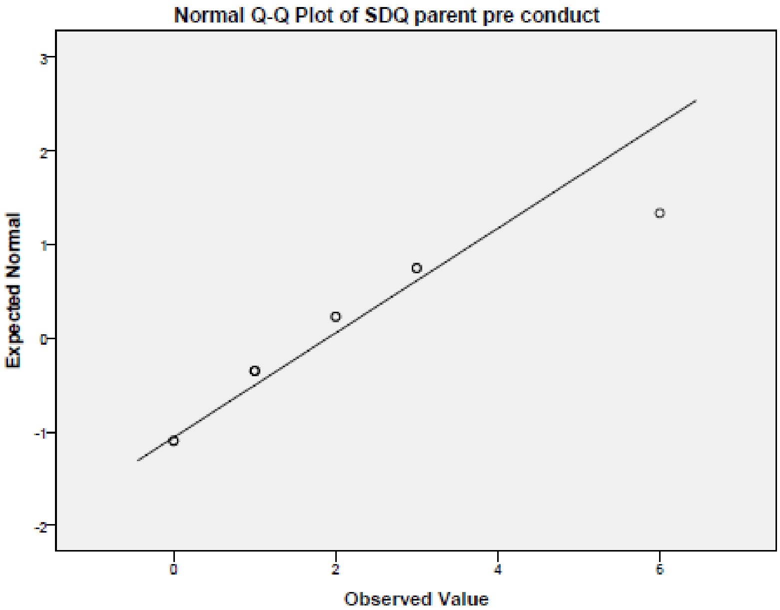
Normal Q-Q Plot of SDQ parent pre conduct
Expected Normal
Observed Value
3
2
1
0
-1
-2
0
2
4
6

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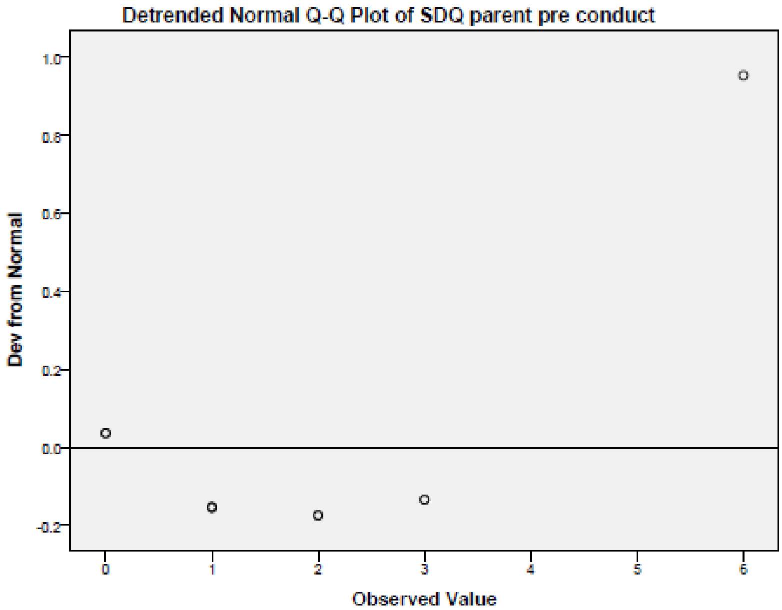

SDQ parent pre hyperactivity

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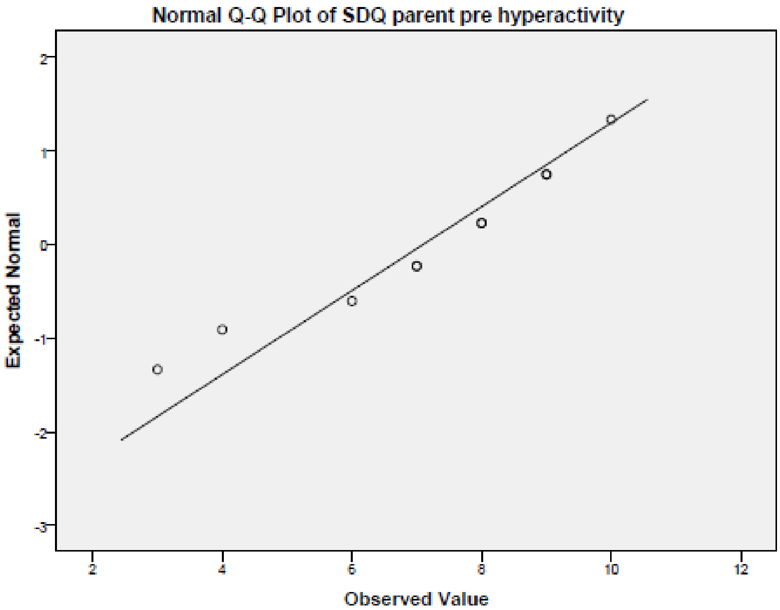
Normal Q-Q Plot of SDQ parent pre hyperactivity
Expected Normal
2
1
0
-1
-2
-3
2
4
6
8
10
12
Observed Value

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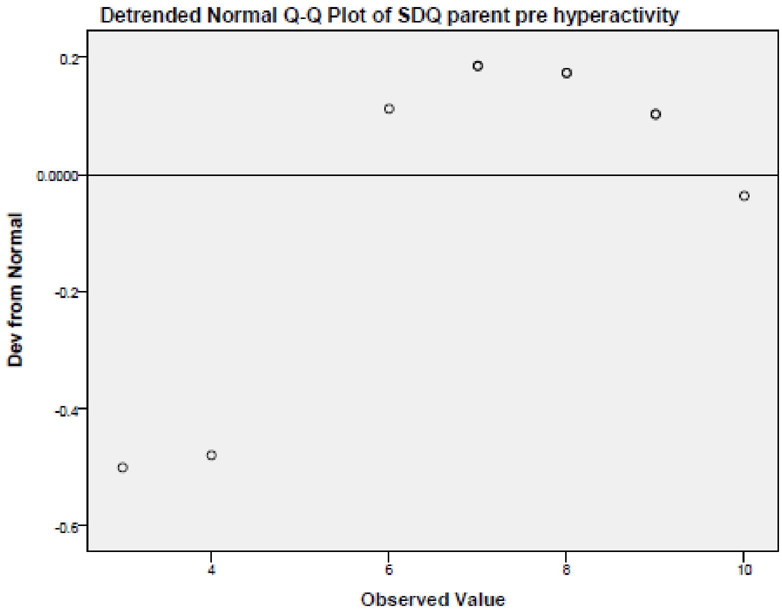
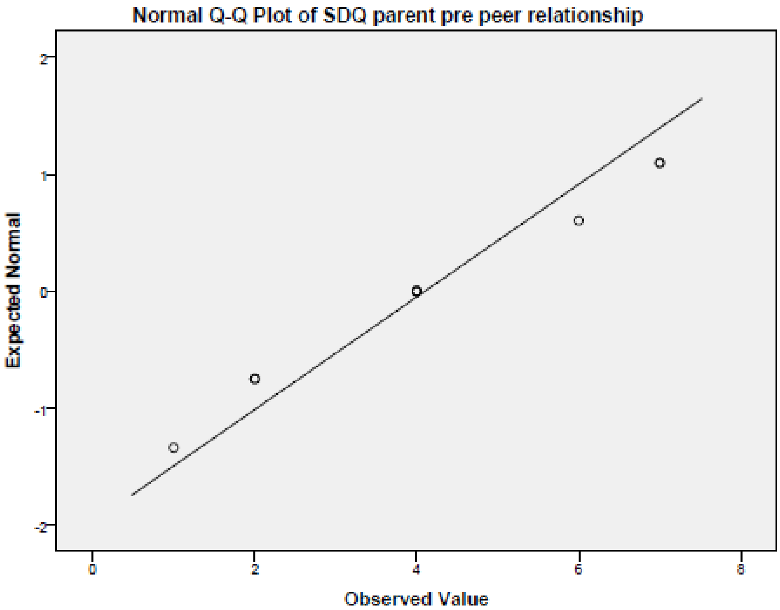
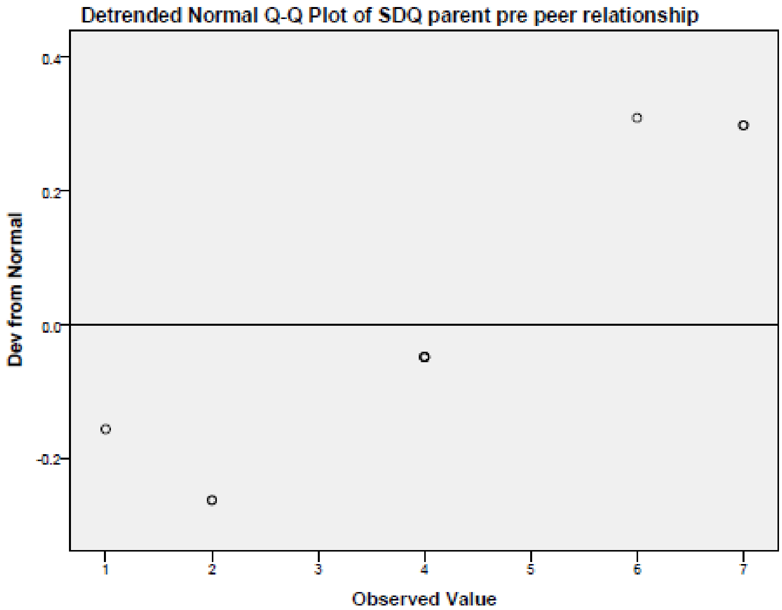


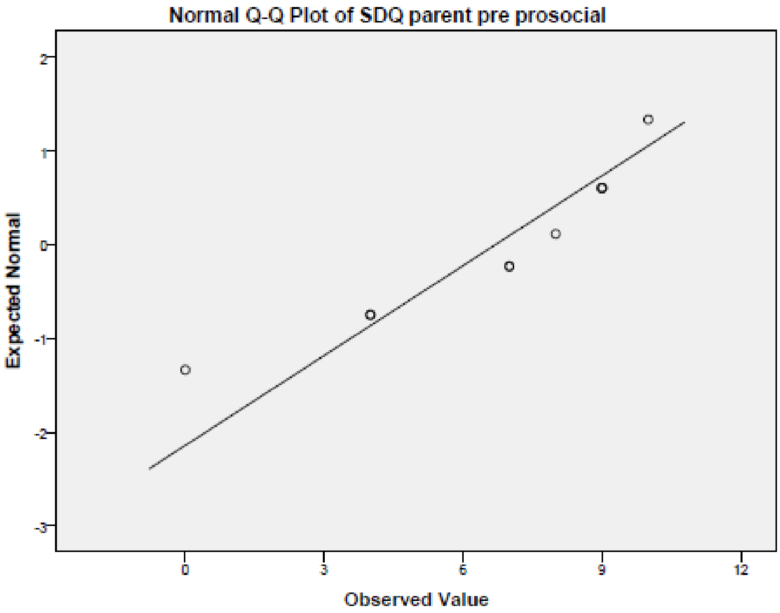
SDQ parent pre peer relationship


Normal Q-Q Plot of SDQ parent pre peer relationship
Expected Normal
Observed Value
2
1
0
-1
-2
0
2
4
6
8

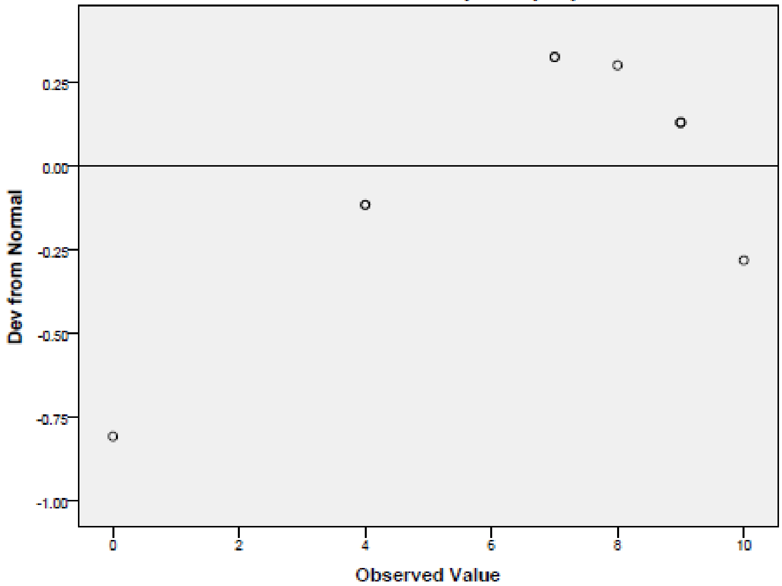
Page 275



SDQ parent pre prosocial


Normal Q-Q Plot of SDQ parent pre prosocial
2
1
0
-1
-2
-3
Expected Normal
0
3
6
9
12
Observed Value

Detrended Normal Q-Q Plot of SDQ parent pre prosocial



SDQ parent pre total

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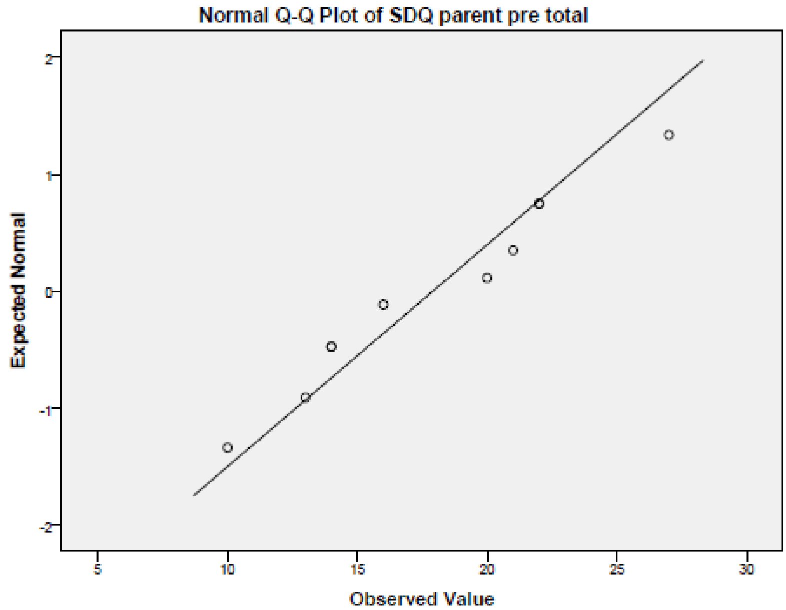
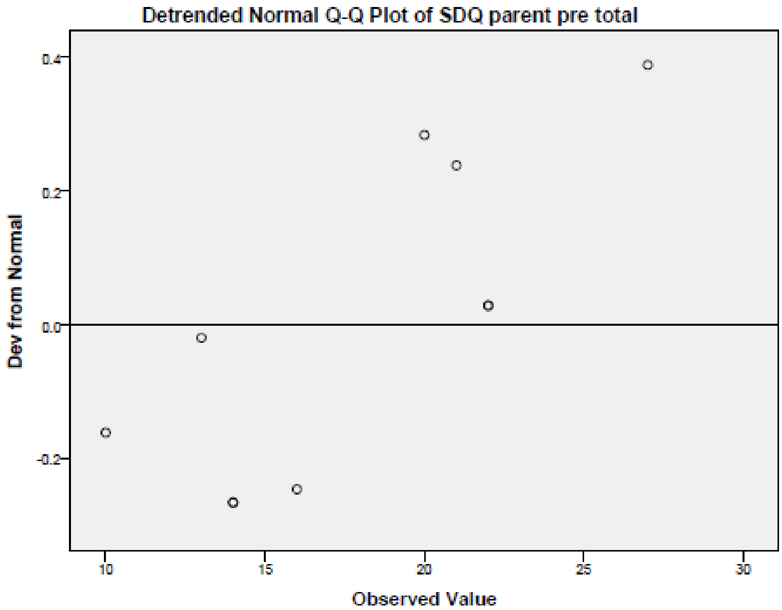

Normal Q-Q Plot of SDQ parent pre total
Expected Normal
Observed Value
2
1
0
-1
-2
5
10
15
20
25
30



SDQ parent post emotional

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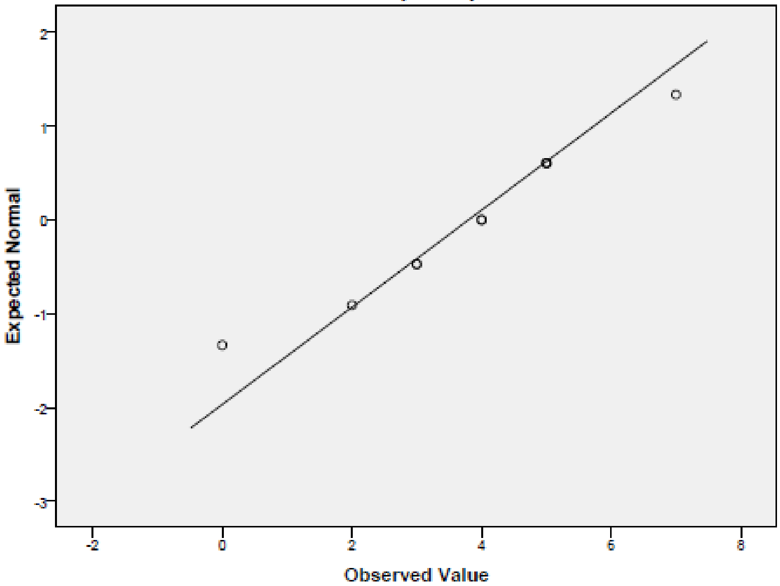
Normal Q-Q Plot of SDQ parent post emotional



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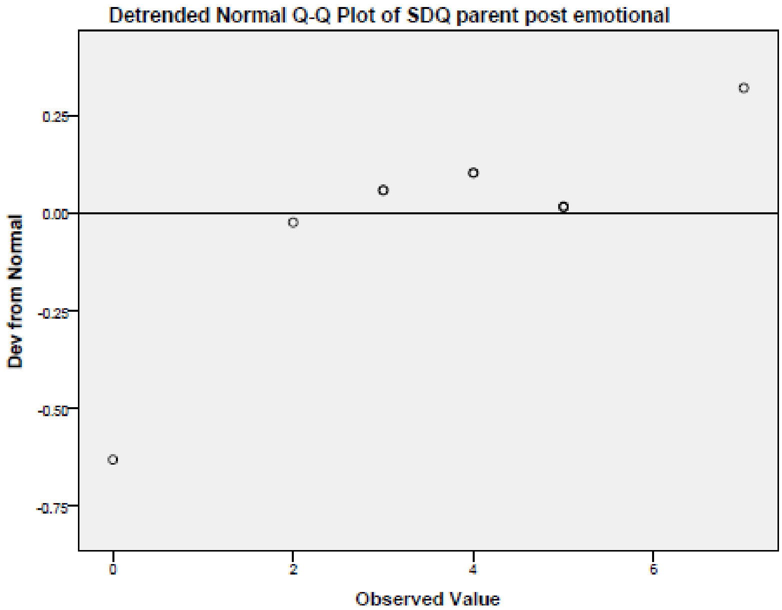

SDQ parent post conduct

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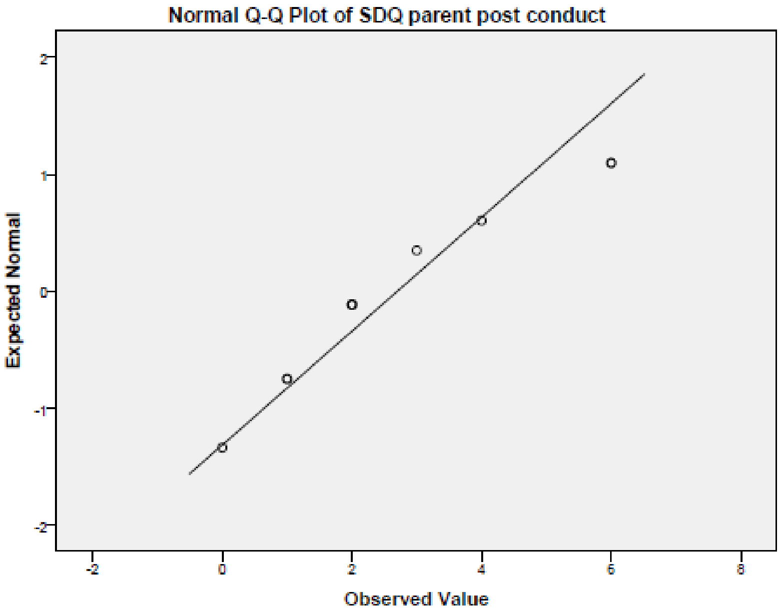
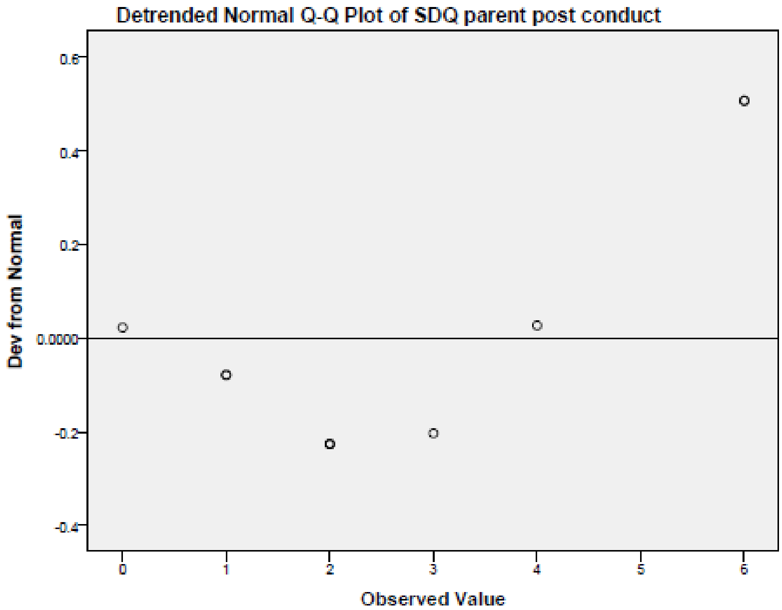
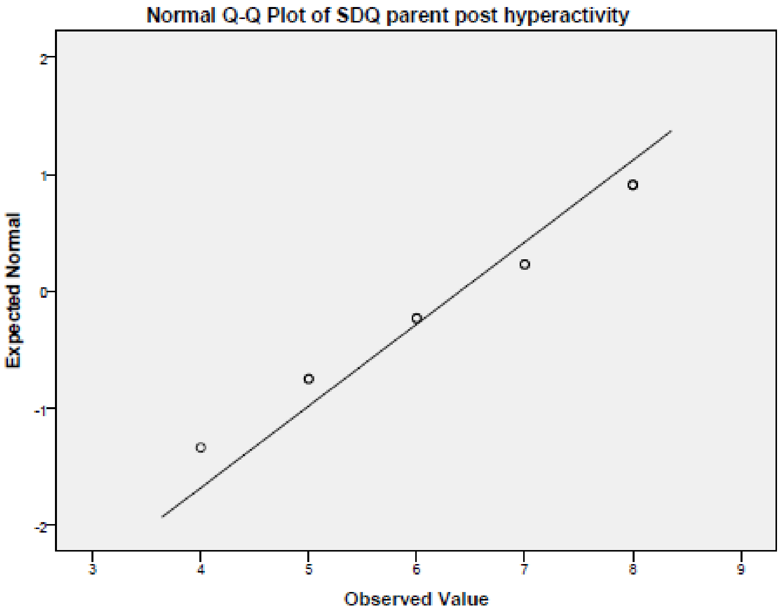
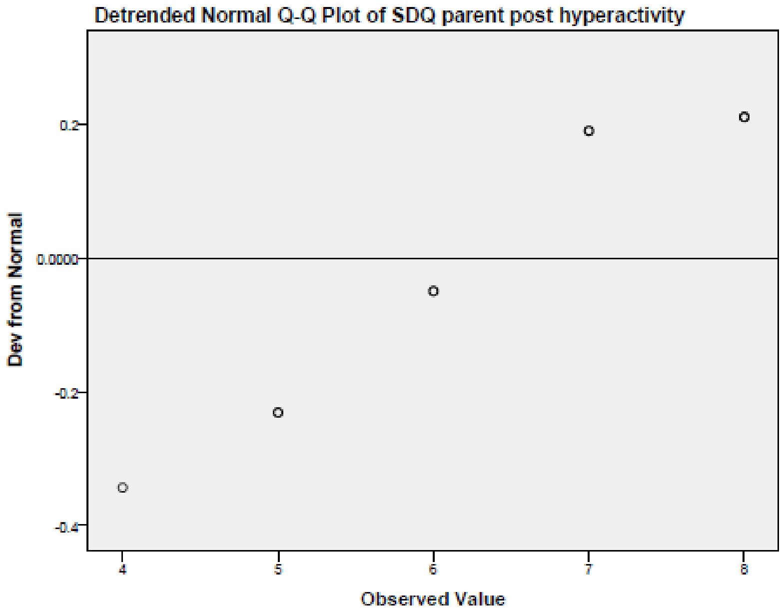

Normal Q-Q Plot of SDQ parent post conduct
Expected Normal
2
1
0
-1
-2
-2
0
2
4
6
8
Observed Value

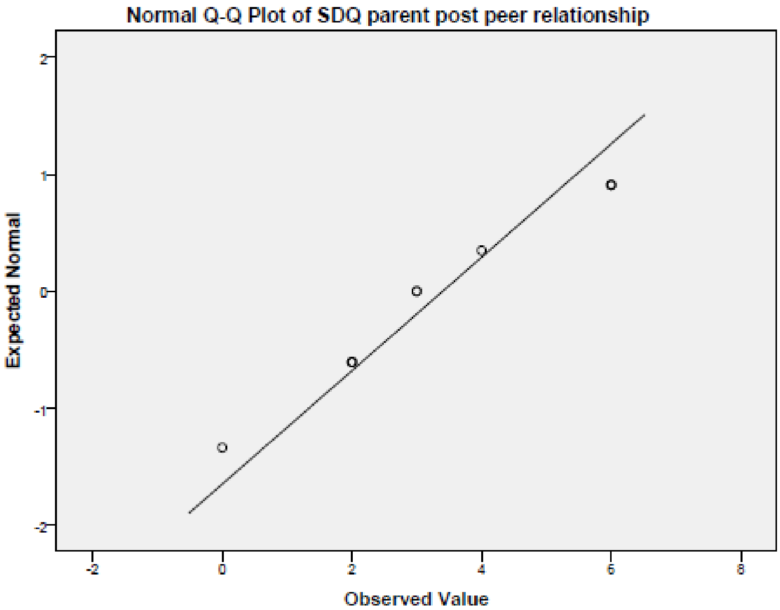


SDQ parent post hyperactivity


Normal Q-Q Plot of SDQ parent post hyperactivity
Expected Normal
2
1
0
-1
-2
3
4
5
6
7
8
9
Observed Value



SDQ parent post peer relationship


Normal Q-Q Plot of SDQ parent post peer relationship
Expected Normal
Observed Value
2
1
0
-1
-2
-2
0
2
4
6
8

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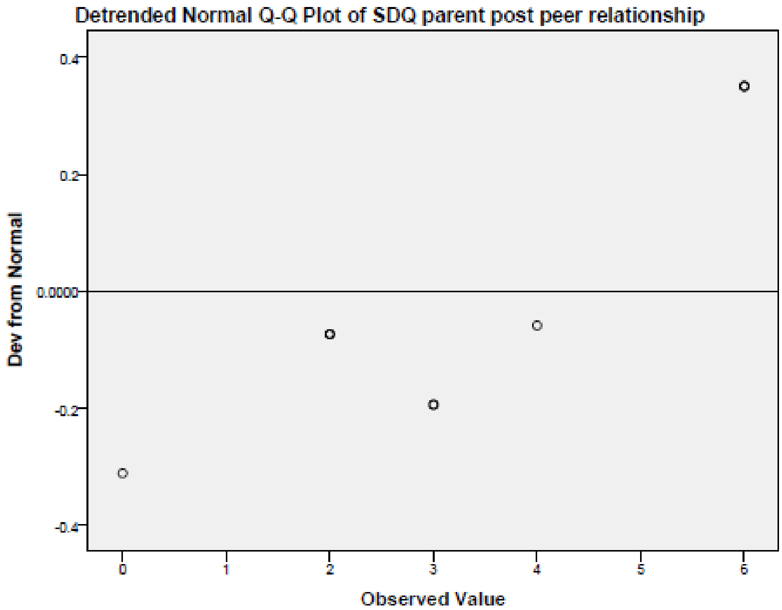
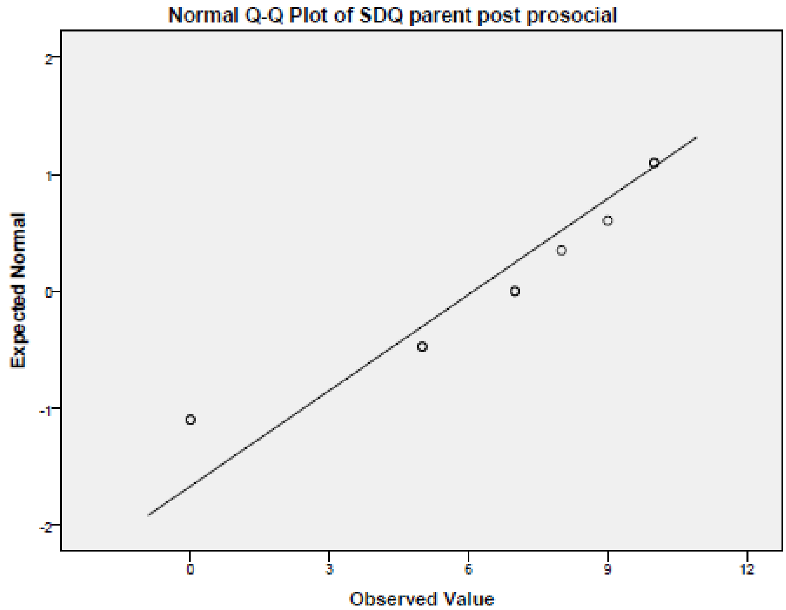
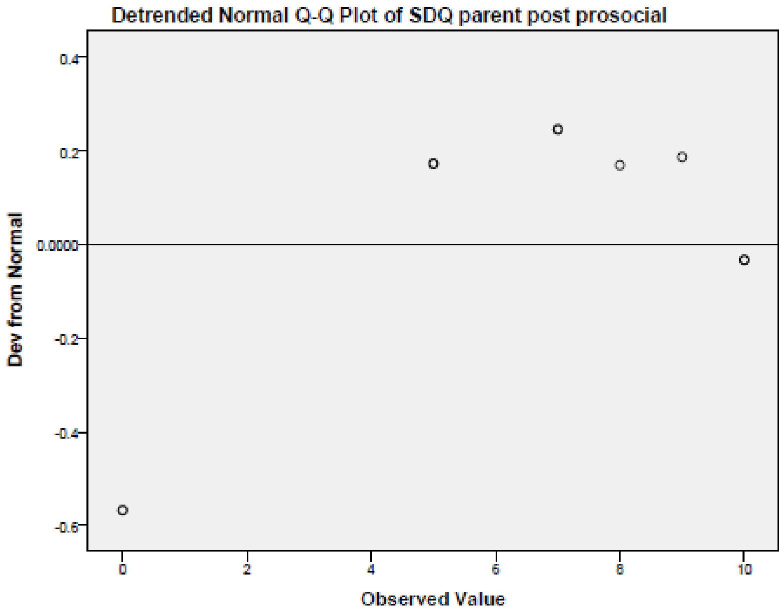


SDQ parent post prosocial


Normal Q-Q Plot of SDQ parent post prosocial
Expected Normal
2
1
0
-1
-2
0
3
6
9
12
Observed Value



SDQ parent post total

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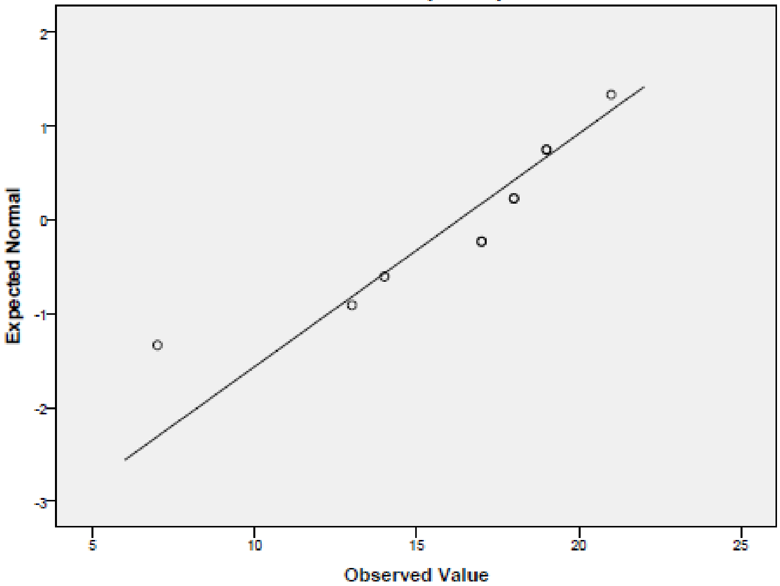
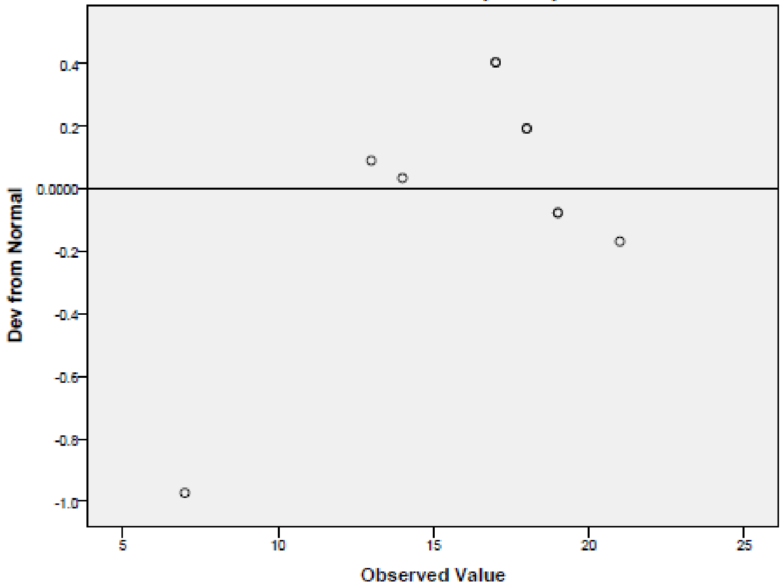
Normal Q-Q Plot of SDQ parent post total



Detrended Normal Q-Q Plot of SDQ parent post total



DCDQ pre control movement

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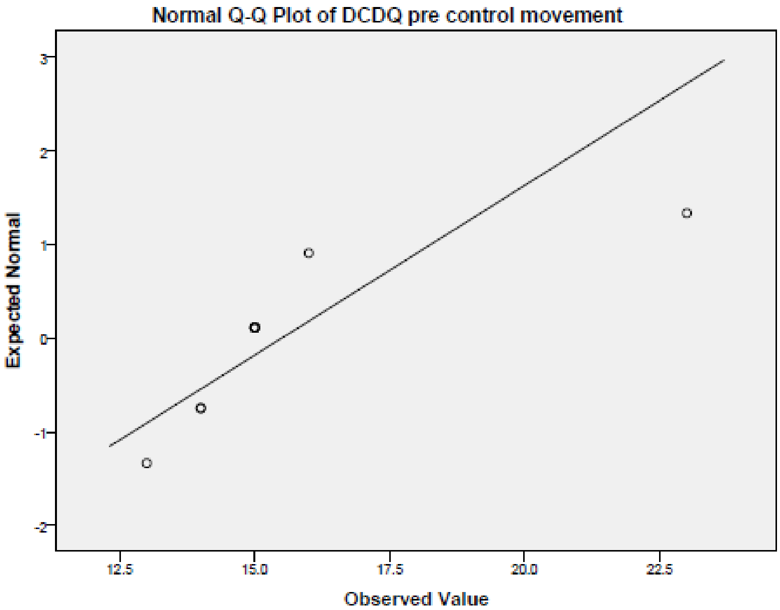
Normal Q-Q Plot of DCDQ pre control movement
Expected Normal
Observed Value
3
2
1
0
-1
-2
12.5
15.0
17.5
20.0
22.5

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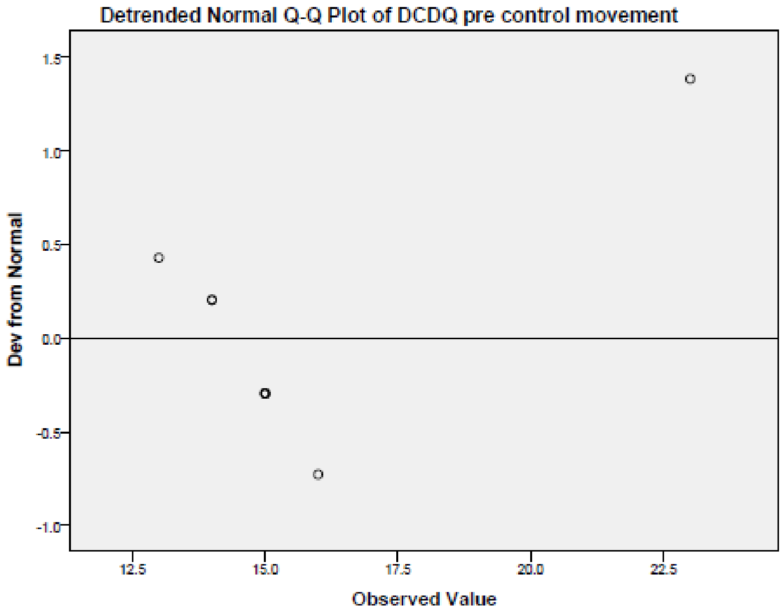

DCDQ pre handwriting

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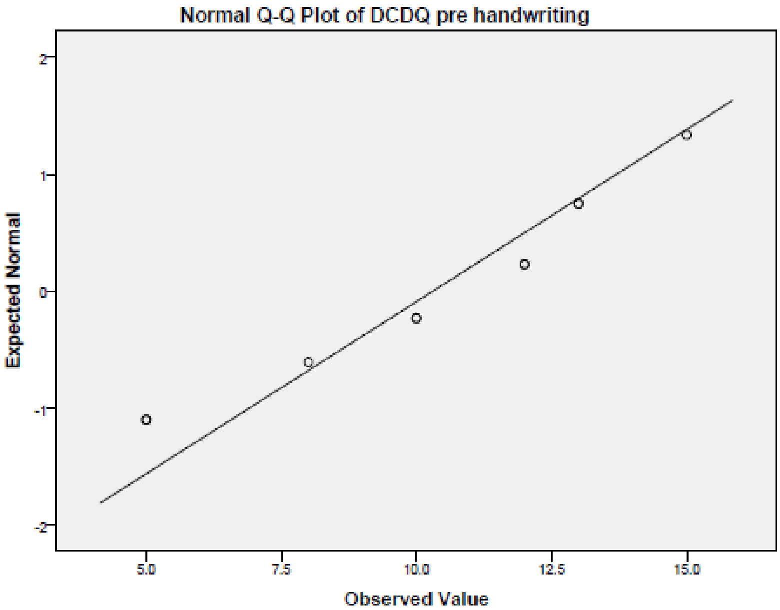
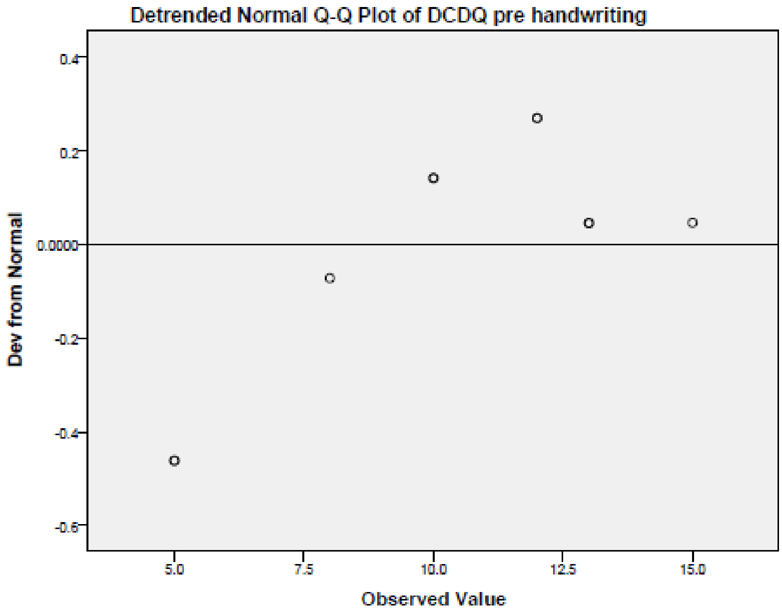
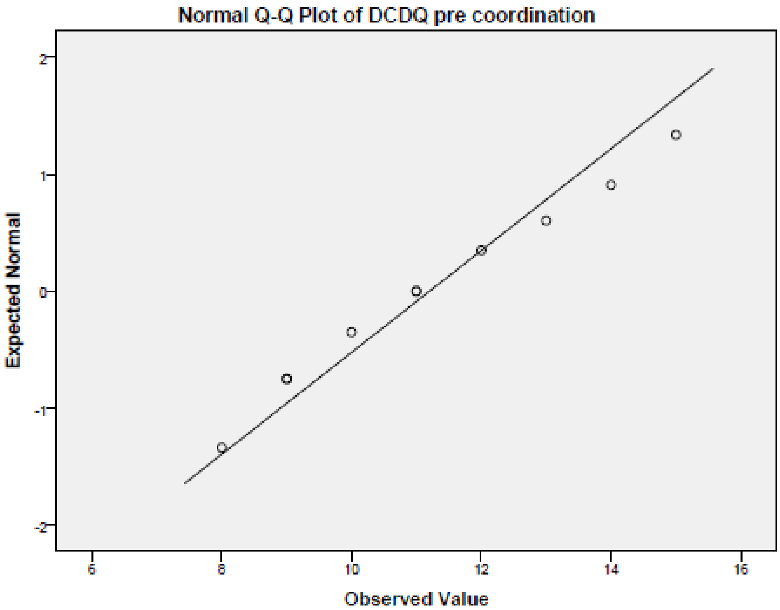

Normal Q-Q Plot of DCDQ pre handwriting
Expected Normal
2
1
0
-1
-2
5.0
7.5
10.0
12.5
15.0
Observed Value

Page 295



DCDQ pre coordination


Normal Q-Q Plot of DCDQ pre coordination
Expected Normal
Observed Value
2
1
0
-1
-2
6
8
10
12
14
16

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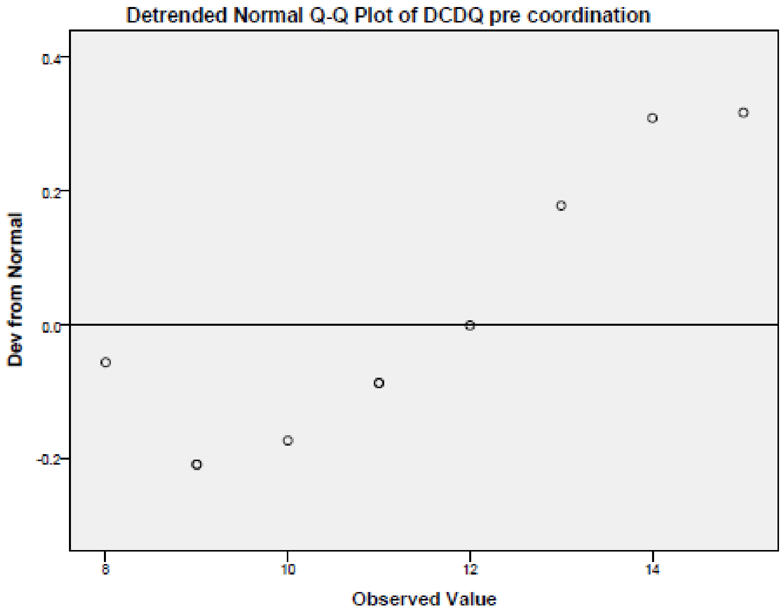

DCDQ pre total

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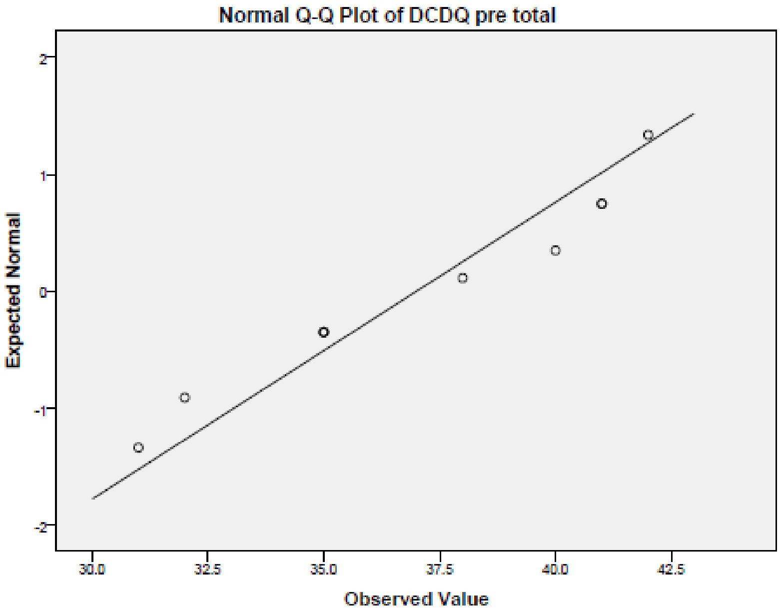
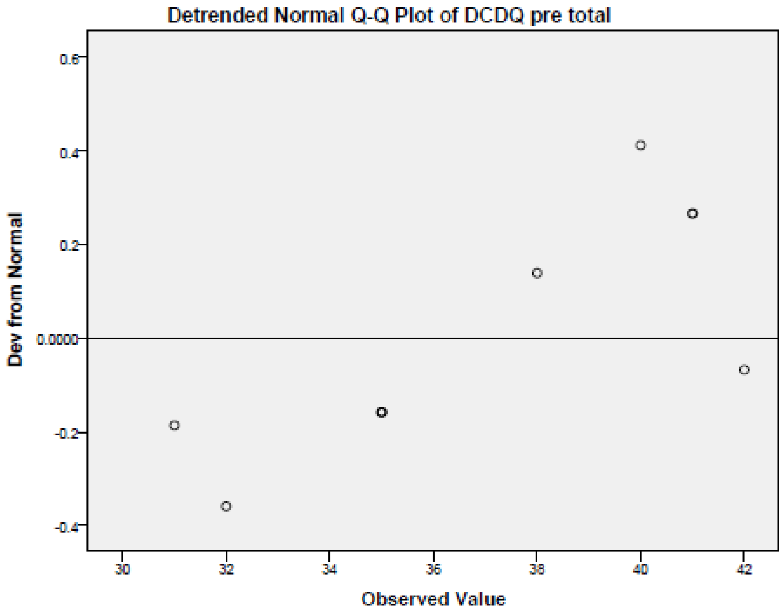
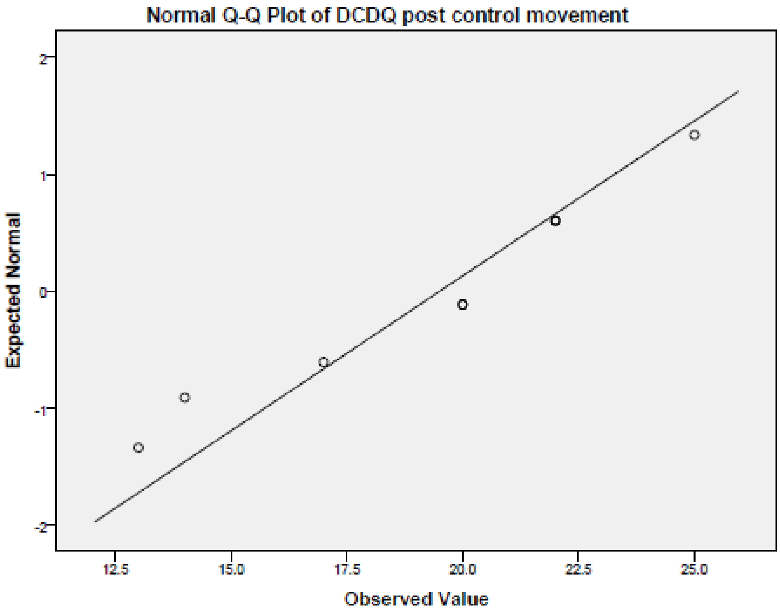

Normal Q-Q Plot of DCDQ pre total
Expected Normal
Observed Value
2
1
0
-1
-2
30.0
32.5
35.0
37.5
40.0
42.5



DCDQ post control movement


Normal Q-Q Plot of DCDQ post control movement
Expected Normal
Observed Value
2
1
0
-1
-2
12.5
15.0
17.5
20.0
22.5
25.0

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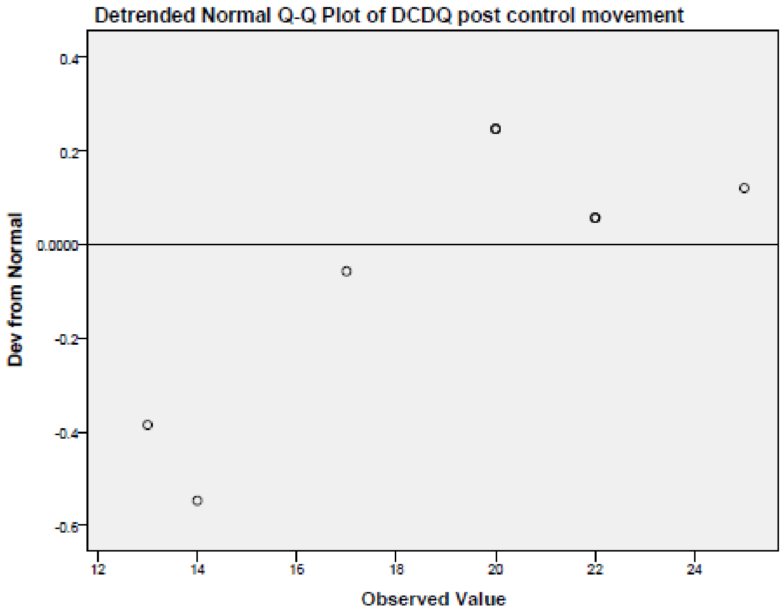

DCDQ post handwriting

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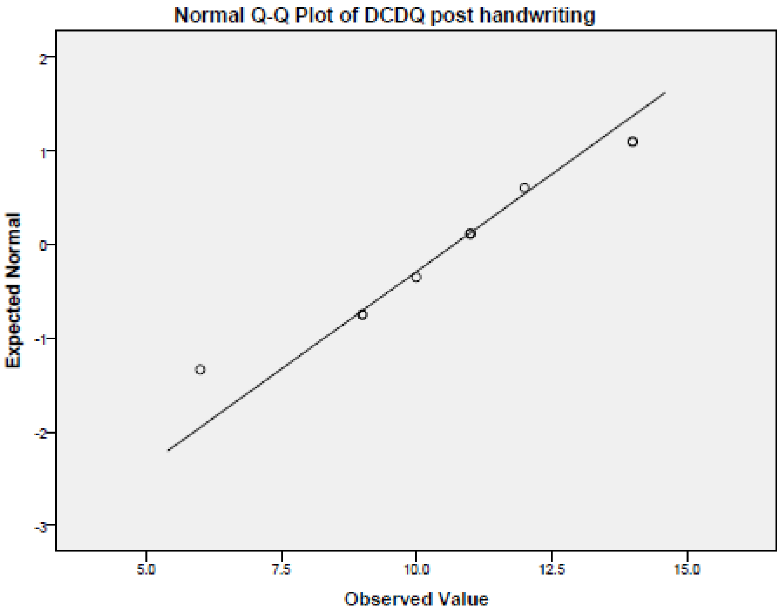
Normal Q-Q Plot of DCDQ post handwriting
Expected Normal
2
1
0
-1
-2
-3
5.0
7.5
10.0
12.5
15.0
Observed Value

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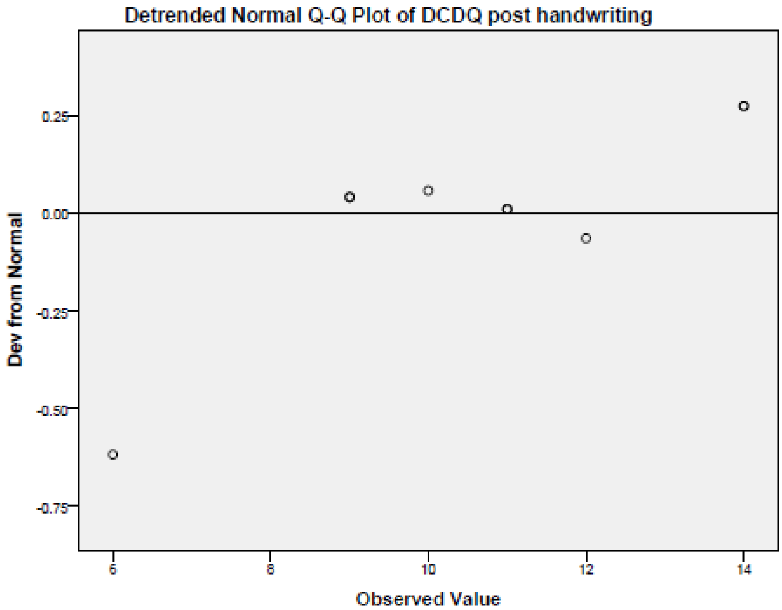

DCDQ post coordination

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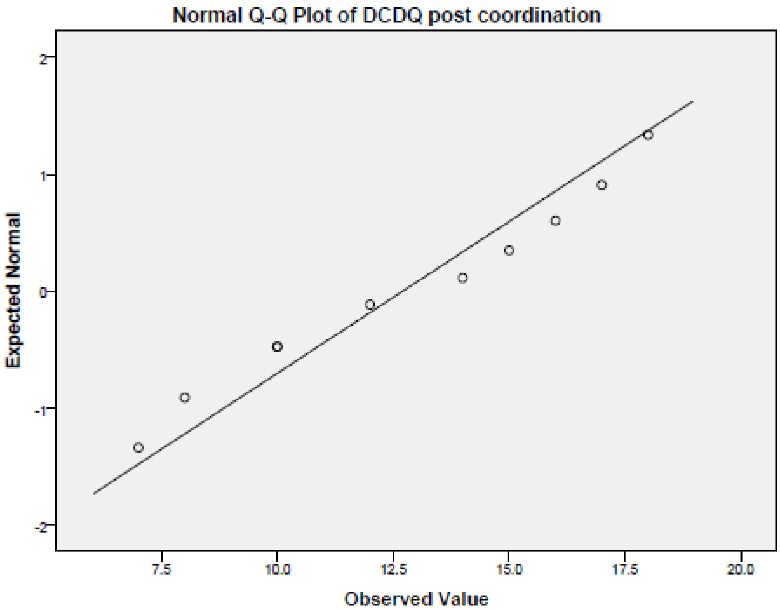
Normal Q-Q Plot of DCDQ post coordination
Expected Normal
Observed Value
2
1
0
-1
-2
7.5
10.0
12.5
15.0
17.5
20.0

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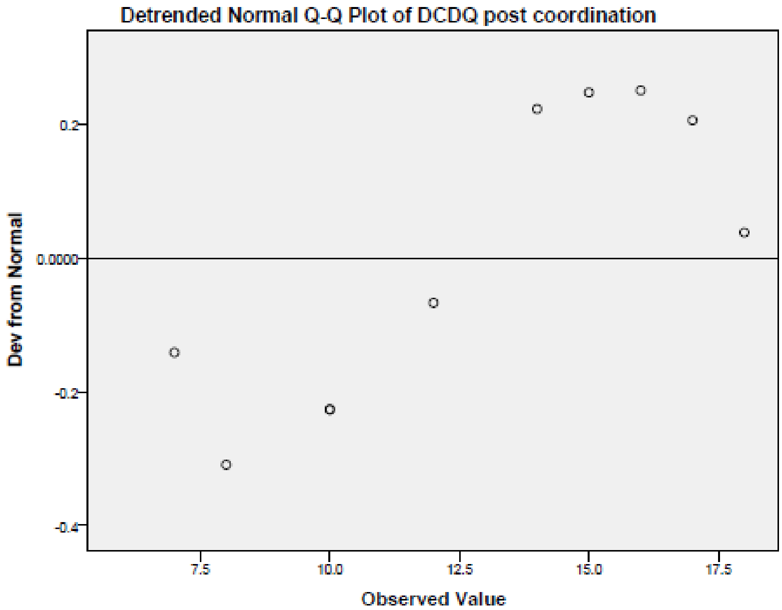

DCDQ post total

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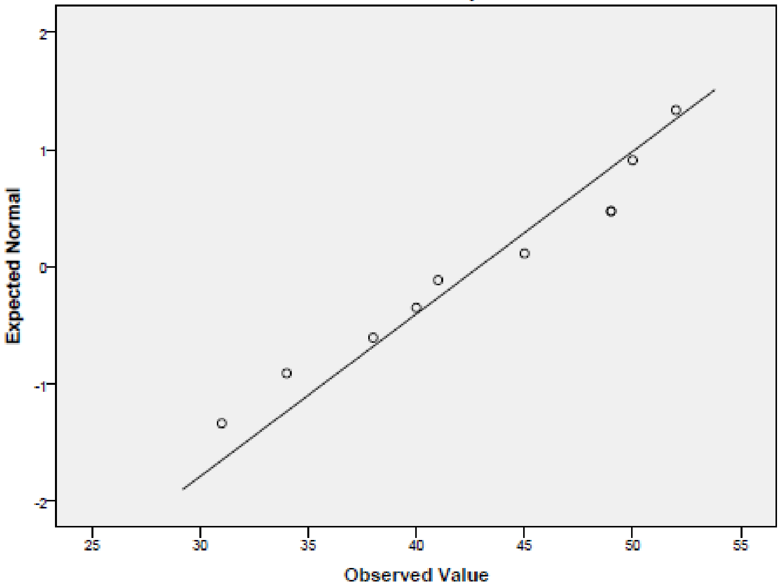
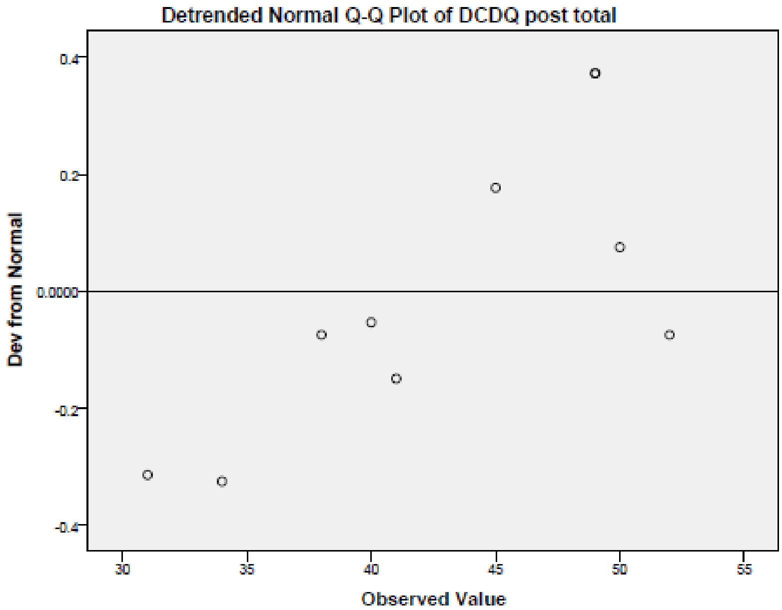
Normal Q-Q Plot of DCDQ post total



Page 307


Detrended Normal Q-Q Plot of DCDQ post total
Dev from Normal
0.4
0.2
0.0000
-0.2
-0.4
30
35
40
45
50
55
Observed Value

Total SDQ Mixed ANOVA

```
GLM SDQteaPREtot SDQteaPOSTtot SDQparPREtot SDQparPOSTtot
  /WSFACTOR=Respondent 2 Repeated Time 2 Repeated
  /MEASURE=TotalSDQ
  /METHOD=SSTYPE(3)
  /EMMEANS=TABLES(Time) COMPARE ADJ(BONFERRONI)
  /EMMEANS=TABLES(OVERALL)
  /EMMEANS=TABLES(Respondent) COMPARE ADJ(BONFERRONI)
  /EMMEANS=TABLES(Time*Respondent)
  /PRINT=DESCRIPTIVE ETASQ PARAMETER HOMOGENEITY
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=Respondent Time Respondent*Time.
```

General Linear Model

Notes

Output Created		19-JUL-2014 14:06:00
Comments		
Input	Data	C:\Users\Melanie Morgan Jones\Documents\ABC Doctorate Documents\PHASE 3\Thesis\data analysis\Thesis data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	10

Notes

Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the model.
Syntax		GLM SDQteaPREtot SDQteaPOSTtot SDQparPREtot SDQparPOSTtot /WSFACTOR=Respondent 2 Repeated Time 2 Repeated /MEASURE=TotalSDQ /METHOD=SSTYPE(3) /EMMEANS=TABLES(Time) COMPARE ADJ(BONFERRONI) /EMMEANS=TABLES(OVERALL) /EMMEANS=TABLES(Respondent) COMPARE ADJ(BONFERRONI) /EMMEANS=TABLES..
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.03

[DataSet1] C:\Users\Melanie Morgan Jones\Documents\ABC Doctorate Documents\PHASE 3\Thesis\data analysis\Thesis data .sav

Warnings

The HOMOGENEITY specification in the PRINT subcommand will be ignored because there are no between-subjects factors.

Within-Subjects Factors

Measure: TotalSDQ

Respondent	Time	Dependent Variable
1	1	SDQteaPREtot
	2	SDQteaPOSTtot
2	1	SDQparPREtot
	2	SDQparPOSTtot

Descriptive Statistics

	Mean	Std. Deviation	N
SDQ teacher pre total	14.8000	5.61348	10
SDQ teacher post total	14.3000	4.71522	10
SDQ parent pre total	17.9000	5.27994	10
SDQ parent post total	16.3000	4.02906	10

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Respondent	Pillai's Trace	.188	2.085[b]	1.000	9.000	.183	.188
	Wilks' Lambda	.812	2.085[b]	1.000	9.000	.183	.188
	Hotelling's Trace	.232	2.085[b]	1.000	9.000	.183	.188
	Roy's Largest Root	.232	2.085[b]	1.000	9.000	.183	.188
Time	Pillai's Trace	.050	.478[b]	1.000	9.000	.507	.050
	Wilks' Lambda	.950	.478[b]	1.000	9.000	.507	.050
	Hotelling's Trace	.053	.478[b]	1.000	9.000	.507	.050
	Roy's Largest Root	.053	.478[b]	1.000	9.000	.507	.050
Respondent * Time	Pillai's Trace	.016	.148[b]	1.000	9.000	.709	.016
	Wilks' Lambda	.984	.148[b]	1.000	9.000	.709	.016
	Hotelling's Trace	.016	.148[b]	1.000	9.000	.709	.016
	Roy's Largest Root	.016	.148[b]	1.000	9.000	.709	.016

a. Design: Intercept
Within Subjects Design: Respondent + Time + Respondent * Time

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: TotalSDQ

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Respondent	1.000	.000	0	.	1.000	1.000	1.000
Time	1.000	.000	0	.	1.000	1.000	1.000
Respondent * Time	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: Respondent + Time + Respondent * Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: TotalSDQ

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Respondent	Sphericity Assumed	65.025	1	65.025	2.085	.183	.188
	Greenhouse-Geisser	65.025	1.000	65.025	2.085	.183	.188
	Huynh-Feldt	65.025	1.000	65.025	2.085	.183	.188
	Lower-bound	65.025	1.000	65.025	2.085	.183	.188
Error(Respondent)	Sphericity Assumed	280.725	9	31.192			
	Greenhouse-Geisser	280.725	9.000	31.192			
	Huynh-Feldt	280.725	9.000	31.192			
	Lower-bound	280.725	9.000	31.192			
Time	Sphericity Assumed	11.025	1	11.025	.478	.507	.050
	Greenhouse-Geisser	11.025	1.000	11.025	.478	.507	.050
	Huynh-Feldt	11.025	1.000	11.025	.478	.507	.050
	Lower-bound	11.025	1.000	11.025	.478	.507	.050
Error(Time)	Sphericity Assumed	207.725	9	23.081			
	Greenhouse-Geisser	207.725	9.000	23.081			
	Huynh-Feldt	207.725	9.000	23.081			
	Lower-bound	207.725	9.000	23.081			
Respondent * Time	Sphericity Assumed	3.025	1	3.025	.148	.709	.016
	Greenhouse-Geisser	3.025	1.000	3.025	.148	.709	.016
	Huynh-Feldt	3.025	1.000	3.025	.148	.709	.016
	Lower-bound	3.025	1.000	3.025	.148	.709	.016
Error(Respondent*Time)	Sphericity Assumed	183.725	9	20.414			
	Greenhouse-Geisser	183.725	9.000	20.414			
	Huynh-Feldt	183.725	9.000	20.414			
	Lower-bound	183.725	9.000	20.414			

Tests of Within-Subjects Contrasts

Measure: TotalSDQ

Source	Respondent	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Respondent	Level 1 vs. Level 2		65.025	1	65.025	2.085	.183	.188
Error(Respondent)	Level 1 vs. Level 2		280.725	9	31.192			
Time		Level 1 vs. Level 2	11.025	1	11.025	.478	.507	.050
Error(Time)		Level 1 vs. Level 2	207.725	9	23.081			
Respondent * Time	Level 1 vs. Level 2	Level 1 vs. Level 2	12.100	1	12.100	.148	.709	.016
Error(Respondent*Time)	Level 1 vs. Level 2	Level 1 vs. Level 2	734.900	9	81.656			

Tests of Between-Subjects Effects

Measure: TotalSDQ

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	2504.306	1	2504.306	432.346	.000	.980
Error	52.131	9	5.792			

Parameter Estimates

Dependent Variable	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
						Lower Bound	Upper Bound	
SDQ teacher pre total	Intercept	14.800	1.775	8.337	.000	10.784	18.816	.885
SDQ teacher post total	Intercept	14.300	1.491	9.590	.000	10.927	17.673	.911
SDQ parent pre total	Intercept	17.900	1.670	10.721	.000	14.123	21.677	.927
SDQ parent post total	Intercept	16.300	1.274	12.793	.000	13.418	19.182	.948

Estimated Marginal Means

1. Time

Estimates

Measure: TotalSDQ

Time	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
1	16.350	1.360	13.273	19.427
2	15.300	.680	13.762	16.838

Pairwise Comparisons

Measure: TotalSDQ

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a] Lower Bound	95% Confidence Interval for Difference[a] Upper Bound
1	2	1.050	1.519	.507	-2.387	4.487
2	1	-1.050	1.519	.507	-4.487	2.387

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.050	.478[a]	1.000	9.000	.507	.050
Wilks' lambda	.950	.478[a]	1.000	9.000	.507	.050
Hotelling's trace	.053	.478[a]	1.000	9.000	.507	.050
Roy's largest root	.053	.478[a]	1.000	9.000	.507	.050

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

2. Grand Mean

Measure: TotalSDQ

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
15.825	.761	14.103	17.547

3. Respondent

Estimates

Measure: TotalSDQ

Respondent	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	14.550	1.305	11.598	17.502
2	17.100	1.008	14.820	19.380

Pairwise Comparisons

Measure: TotalSDQ

(I) Respondent	(J) Respondent	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
1	2	-2.550	1.766	.183	-6.545	1.445
2	1	2.550	1.766	.183	-1.445	6.545

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.188	2.085[a]	1.000	9.000	.183	.188
Wilks' lambda	.812	2.085[a]	1.000	9.000	.183	.188
Hotelling's trace	.232	2.085[a]	1.000	9.000	.183	.188
Roy's largest root	.232	2.085[a]	1.000	9.000	.183	.188

Each F tests the multivariate effect of Respondent. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

4. Time * Respondent

Measure: TotalSDQ

				95% Confidence Interval	
Time	Respondent	Mean	Std. Error	Lower Bound	Upper Bound
1	1	14.800	1.775	10.784	18.816
	2	17.900	1.670	14.123	21.677
2	1	14.300	1.491	10.927	17.673
	2	16.300	1.274	13.418	19.182

APPENDIX 24 -

PARTICIPANT 2

20:12:13

In the last six weeks Matthew (2)
has become more confident. He
offered to take the part of Joseph
in the Carol Service and although
this was a non speaking part, he
followed instructions and appeared
more confident in front of the school.
Although Matthew's confidence has
grown, his responses are not always
socially appropriate – for example –
when asked to leave the classroom
he shouted Goodbye and waved at
the teacher.

[illegible signature]

APPENDIX 25 -

PARTICIPANT 9

From: Sam Bounds [mailto:sambounds@icloud.com]
Sent: 17 November 2014 16:14
To: Melanie Morgan-Jones
Subject: Re: Rohan,

Hello

Rohan is experiencing some significant changes in his emotional state, we are noticing less frequent issues at school with his behaviour and we are receiving feedback from the staff that he is more focused and responsive during lessons. We have noticed changes at home too. He is seeming far more open to the idea of being away from us such as his change of decision about joining the schools residential trip and going off in shops to, look round by himself. These are things he is usually very adamant that he will not do but is expressing himself the desire to do these things. We noticed the changes starting to happen around a fortnight into the treatment. He almost seemed to be more gentle and settled, something he has had issues with for many years. In our opinion there seemed no other contributing factors as he had settled into his class and was not under any new support mechanisms at school. Home was fairly consistent to.

Thank you for allowing us to be part of the trial.

Many thanks

Sam Bounds
Doula
07800645987
Sambounds@icloud.com
www.samboundsdoula.co.uk

APPENDIX 26 -

PARTICIPANT 3

Post 3

UNIVERSITY OF BATH

Please consider the behaviour and function of the child within the last two weeks during lesson times.

Child's name: DANIEL FAWDRY	Class: Y4 MRS QUANTICK

School : PEWSLEY PRIMARY	Date completed: 19.12.13

Name of Person completing the form: MRS QUANTICK

Key

1	2	3	4	5
Very Poor	Poor	Barely acceptable	Good	Very Good

Please tick the appropriate box using a black biro/ink pen

Attention - How well have they focused in lessons within the last two weeks?

1	2	3	4	5
				✓

Concentration span- How long have they concentrated during the lessons in the last two weeks?

1	2	3	4	5
				✓

Work completion rate- How quickly have they been completing their work in the last two weeks?

1	2	3	4	5
				✓

Handwriting quality- How is their writing quality in the last two weeks.

1	2	3	4	5
			✓	

improved

" Daniel's colouring, drawing, writing and attention to detail has been neater and much improved. I don't know if he has been taking more care and it is as a result of the treatment."

Mrs. Quartick
Classteacher. 19. 12. 13

APPENDIX 27 -

PARTICIPANT 6

I WK R. info of qualitative from teacher

Post 6

UNIVERSITY OF BATH

Please consider the behaviour and function of the child within the last two weeks during lesson times.

Child's name: Tom Mason Class: J (year 4).

School : St. Michael's, Aldbourne Date completed: 19th Dec '13.

Name of Person completing the form: Mr Jarvis (class teacher).

Key

1	2	3	4	5
Very Poor	Poor	Barely acceptable	Good	Very Good

Please tick the appropriate box using a black biro/ink pen

Attention - How well have they focused in lessons within the last two weeks?

It varies between the 2!

1	2	3	4	5
		✓	✓	

Concentration span- How long have they concentrated during the lessons in the last two weeks?

1	2	3	4	5
		✓	✓	

Work completion rate- How quickly have they been completing their work in the last two weeks?

1	2	3	4	5
	✓			

Handwriting quality- How is their writing quality in the last two weeks.

1	2	3	4	5
		✓		

In handwriting sessions Tom's handwriting has improved but he does not maintain the consistency in literacy or other subject when recording.

Over the last couple of weeks Tan hasn't been 'bumping into things' as much - I've certainly noticed that although he is prone to clumsily knocking things over now & again when he doesn't look at his surroundings.

It has been nice to see Tan running around the playground with more confidence at break & lunch times - something which he doesn't always do, so that's another positive!

In lessons Tan is trying to improve staying on task - this also ties in with his IEP - and when given a task (e.g. in Maths) he has stuck to it, trying to complete it which suggests there has been a development in his concentration span.

It is difficult to measure Tan's attention in lessons, he still needs reminders and works well with a tick chart although he has sat a little more still for slightly longer periods.

APPENDIX 28 -

QUALITATIVE INFORMATION

All of the information gained was as a result of the research assistant requesting feedback from the mothers about the treatment (sometimes the child was with the mother and spoke on the telephone). The researcher did not prompt by asking questions and there was no input given during the statements. The person at the other end of the telephone was permitted to speak freely.

Participant 1 - Sammy Hartstein:

Mother - "His anxiety reduced immediately following the 1st treatment. He usually hates school but after first treatment he said, "It is school tomorrow, oh well, so what." Mother –"This is a major thing for us as a family."

Sammy reported to mother: - mother quoted Sammy, "He said that he was able to hold his temper more since the treatment. He also said that he felt much happier."

Mother - "He is much happier."

Mother - "Normally it is hard to get him into the car but he would get in by himself to go to the treatments as he loved what it did for him, and this continued throughout the treatment period. This was despite the fact that he said -"

Sammy - "This treatment feels like knives sticking into me."

Mother - "He does have hypersensitivity to touch and to other things."

Mother - "He has been more chilled out at home since the treatments. His behaviour can be cyclical but after the treatments he is always on an 'up' and this lasts some days."

Mother - "Sammy is much more cheerful and positive and after the treatment he is amazing and lovely. Normally Sammy sees everything as black and white and perceptions of events are usually very black so he wasn't like this after the treatment times. The teacher had told me that for two days after the first treatment Sammy was so calm that he was much more tolerant in class, not holding himself in such a tight way. She told me that he was not being 'tight'."

Mother - "He was so improved that he was awarded a prize at school and this doesn't usually happen. His communication skills improved so that the teacher told me that she had "noticed that though still limited he was trying to say how he was feeling" and this is normally unheard of."

Mother - "His mental state is much improved from his normal state. Normally he is angry quite often and very frustrated. His moods have been generally much better and definitely less angry."

Mother - "He bumps into things a lot less. Teacher tells me that 'He is less 'gangly'- less all over the place- less clumsy'."

Mother - "The teacher told me that she had noticed that 'he can throw the bean bag ball much easier since the treatment.'"

Mother - "Prior to the treatment he would wake throughout the night intermittently and would have nightmares, but no nightmares since the treatment and is sleeping through the night. He is much more relaxed as a person since the treatment. After the first treatment and after the night of the treatment, Sammy said 'that sleep was the best ever sleep'."

Mother - "He has been spilling things less and has had better coordination generally since the treatment."

Mother - "Sammy's hand dexterity improved and he told me that he is doing all the hand dexterity stuff much better. He is tying shoe laces better now too. He is able to write better since the treatment and it happened immediately."

Mother - "Not so many incidences of anger at school since having the treatment."

Mother - "Throughout each of the 6 week treatments he fell asleep immediately he started getting the treatment; this is unheard of, so he was really relaxed."

Mother commented on improvements at the end of the intervention in front of Sammy and he got very angry because change is a frightening concept for Sammy.

Participant 2 - Matthew Jacobs:

Mother - “Matthew is much more confident since the treatment.”

Mother - “Matthew has been more confident, and he volunteered to play the part of Joseph in the Christmas play.”

Dad - “Matthew is able to ride his bike and play ball games better, kicking the ball better and he isn’t so clumsy and doesn’t knock things over so much. He doesn’t fall or spill things so much.”

Matthew - “I feel more relaxed since having this treatment.”

Participant 3 - Daniel Fawdry:

Mother - “Daniel’s handwriting is improved. His class teacher told me that ‘Daniel is colouring, drawing, writing and showing more attention to detail since the treatment’ and that the improvement was astounding. It was a ‘profound improvement within two sessions of this treatment’.”

Mother - “Daniel is so much better in his ability to play games, kick the ball and catch the ball. He isn’t so clumsy. Daniel told me, ‘I am able to do so many more things and I’m better in my work at school since having this treatment.’

Mother - “Daniel is much more confident even though he is a quiet boy. Daniel told me that his body feels less twitchy, and calmer.”

Teacher - “Daniel’s swimming coordination has improved a lot since having this treatment.”

Participant 4 - Jack McNally:

Comments from mother were not available as she could not give the time for the qualitative as well as all the form completion in week 8. She was always very busy.

The only communication received was the one from the teacher, and this was sent in an envelope via the intervention practitioner, Julie James, who then passed it to the Researcher, Melanie Morgan-Jones.

Participant 5 - Stephen Webber:

Mother - "After the first treatment I needed to adjust the saddle on the horse because Stephen is different. (*She teaches children to ride and is an OT*). His balance was different even from the first treatment, less clumsy and bumping into things less. He has been more patient during the treatment, not reacting so much, not getting so angry if people have made him angry. He told me 'everything I do is easier and I'm not bumping into things so much.'"

Mother - "Stephen's sleeping has been much improved since the beginning of this treatment; he used to wake up through the night and he is sleeping through more."

Participant 6 - Thomas Mason:

Mother- "Tom is much less clumsy since this treatment and he is getting better in his work at school. He seems to be able to do it easier/ better. He is much more confident and upright so has better posture. He is much more articulate, calmer, and concentrates more. Since this treatment started he is able to stay asleep once getting to sleep."

Mother - "Tom had had a couple of treatments; he said that it didn't feel like knives anymore and he looked forward to the treatment. I can't believe how much better his balance is."

Tom - "My body has been clicking less."

Participant 7 - Harvey Cloke:

Mother - "Harvey felt very wobbly after the first treatment and said that he was feeling that he was falling forward. As the treatment went on he was not so clumsy and didn't drop things so much at all. Usually, with Harvey, the improvements only continue for 6 days after the treatment and then he will be a little more clumsy again."

Harvey - "I can speak better and get my words out more after having the treatment and then after 5 or 6 days I can't get my words out again"."

Participant 8 - Archie Cloke:

Mother - "Archie told me that the treatment hurt when it was happening first. He is hypersensitive to touch. After he got used to it he still looked forward to it and there was a massive difference in him because he could sleep better, he became more patient, losing his temper much less and there were huge improvements in his sporting ability."

Archie - "I'm not dropping things like I was all day long. Now I'm just dropping something once a day and sometimes not at all and I've only fallen over once in the week and I was always falling over lots every day."

Mother - "He is not wriggling about on the sofa now since having this treatment because I was always telling him off for it but it never changed."

Mother - "Archie is more happy and confident since starting this treatment. He seems happier all round."

Participant 9 - Rohan Bounds:

Mother - "Most notable since the beginning of the treatment was that Rohan was able to get up earlier and his sleeping was much better. Normally Rohan is clingy, but since the treatment he has been more confident. He usually doesn't leave me in a shop but during having this treatment he asked if he could wander off in the shop on his own. I was shocked as it was such a change. He is not walking into things so much. He seems more relaxed and definitely more confident. He is joining in in school games more since this treatment started. He is able to organize himself more since the treatment but it was bad before. Absolutely loves the treatments. Never saw him so still before because he doesn't stop at all normally. The biggest thing that happened which Chris and I were shocked about was that he asked if he could go away on a camp. He had point blank refused for a year and a half but when he was having this treatment he said, 'I want to go on the camp now.' He went and he had never been away from us and he went for a week and absolutely loved it. He is much more confident and able to stand up for himself when other children say nasty things to him.”

Participant 10 - Ben Noble:

Mother - “Ben had really bad reports in most subjects before this treatment. He has had one since that time and the only difference was the treatment and the report is so different. All the teachers are really pleased with Ben. All the report is excellent.

Ben is able to walk along in front of me and he is straighter and not so wobbly. He can ride his bike better and he has decided to join a club at school. He never volunteered to do anything like this before so this is a surprise. He loves the treatment and is more relaxed all round really. The teachers have told me that his handwriting is better but I’ve noticed it too. Ben says that he can write better. He is much more confident than he was. What I’ve noticed too is that he is able to do his maths better. When he was racing with his sister lately his arms weren’t going all over the place as they used to. Ben seems to feel happier trying new things. Ben has told me that he feels ‘happier inside since having the treatment.’”

Overlapping statements from Practitioners performing intervention (information sent to researcher on feedback forms post treatment sessions).

“Children’s backs seemed uneven at the beginning of the treatment.”

“As we treated the two sides of the body (e.g. left and right of the spine) of the children there was an even presentation and feel to the muscles and ligaments on both sides.”

Statement from child during intervention and not through research assistant.

Tom Mason – Participant 6 “This treatment feels like knives going in.”

Intervention practitioner noted down his statement on a feedback form immediately the child had spoken.

Statements from teachers about particular children

Matthew Jacobs - Participant 2

Head teacher feedback either given on the back of measure forms or on papers passed to the researcher by secretary of the school:

Head teacher - “Matthew is much more confident since having the treatment but so much so that he goes over the top showing extremes in demonstrations of activities or even inappropriate responses in play situations and even showing off. Other children look at each other as though they cannot understand what is happening to him during play time.”

Head teacher - “Matthew volunteered to be Joseph in the Christmas play. He has never volunteered to do anything like this before.”

Head teacher - “Matthew shouted goodbye to his class teacher and waved to him, which was quite inappropriate.”

School secretary - “Matthew spoke with me and directed the statement straight at me and he has been in this school for some years now and has never spoken with me. He is much more confident.”

Tom Mason - Participant 6

Teacher - This teacher wrote a letter to the researcher and it was collected from the school

“Tom is much less ‘gangly’ since this treatment, seems more able to interact in class, less disruptive. He got an award for his school work half way through the treatment.”

Participant 4 - Jack McNally:

The only communication received was the one from the teacher, and this was sent in an envelope via the intervention practitioner, Julie James, who then passed it to the Researcher, Melanie Morgan-Jones.

Teacher, Rose Lohr - "Liz, Jack's teacher, reported that Jack could read a board with 80 words on it. This was just after the 4th treatment and he could not read any of them before the treatment."